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PICKS and SHOVELS

By O. E. POTTER

Lost and Found

The proverbial search for a needle in a haystack is mere child's play to the search of the small blue shield emblematic of membership in the American Society of Civil Engineers from an 84,000-yard borrow pit. But truth is stranger than fiction, they say, so here's the story.

Our Editor, whose peregrinations during every construction season to interesting construction projects located all over the map has earned for him the facetious title "the Vagabond Editor," by those of the staff who remain behind, landed at the Muskingum Conservancy Project in Ohio in May. In his usual enthusiastic manner, he set out to "do" the dams, notebook in hand and camera slung over the shoulder, with a weather eye always out for photographs. During his strenuous activities of climbing down into borrow pits, and out again, loading trains of tractors and crawler wagons, being sure he wasn't scooped up in a bucket of dirt, the Am. Soc. C. E. pin left its rightful owner and so far as our grieved Editor knew, was planted, for all time, somewhere in one of the dams. To which, we suspect the Editor said "Dam," to put it mildly.

Back once more in the office for a breathing spell before the next dash to a job, the Editor related the sad, sad story of the burial of his pin in old Mother Earth and gave it up as irretrievably lost.

Then one day, several weeks after his visit to the Muskingum projects, the Editor picked up his telephone in answer to its insistent jingle and was greeted by a voice saying,

"This is C. S. Joslyn, Resident Engineer on the Clendenen Dam in Ohio."

"Oh yes, Mr. Joslyn," said the Editor pleasantly.

Mr. Joslyn continued, "I called to tell

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Carrying Industrial Railway on Pontoons Across the "Bottomless Hole." See page 5.

Cushions for Concrete on Test Sections of Oklahoma Paving

(Photo on page 40)

POURING 1,100 feet of 10-7-10-inch slab 20 feet wide in two 5-hour shifts daily was the average of S. O. Maxey & Co. on a paving contract on U. S. 70 east of Walters, Okla., this spring, although they were slowed down to an average of 800 feet a day when placing the new sand cushion sections for the first time in this state. There were three of these sections that had special treatment. Over the sticky gumbo, A7 soil, for 3,500 feet there was a 6-inch sand cushion; on another section of 4,700 feet there was a 3-inch sand cushion; and for 4,000 feet, special soil treatment by the removal of the top foot of the old grade, which was a compacted macadam, and filled with a foot of top soil, A3.

To complete this treatment of breaking up the capillarity of the base and top surfacing, as soon as the forms were stripped, French drains 18 inches square were carried the full length of the sand treatment on both sides of the slab, with outlet trenches every 100 feet.

Aggregates and Bulk Cement

With a roomy siding within the limits of Walters the contractor was able to set up a well-planned aggregate and batching plant and a very good bulk cement handling plant. The crushed limestone coarse aggregate came from Richards Spur, Okla., about 70 miles distant, by rail and the sand 150 miles from Dover, Okla. A Northwest crane with a 3/4-yard Blaw-Knox bucket unloaded the materials to the Blaw-Knox batching plant where batches of 1,482 pounds of sand and 2,288 pounds of stone, actual weights, were delivered to the fleet of 18 batch trucks, maximum, of which 5 were 2-batch units. The batch trucks as well as all labor on the job was double shifted each day, two 5-hour shifts, which gave the contractor fresh men after the noon lunch period.

The contractor built a platform 60 feet long by 10 feet wide which would accommodate two box cars and leave some length over to allow for poor

Despite Dust Storms and Delays of Extra Work S. O. Maxey & Co. Paved 3 Miles in 3 Weeks

spotting of the cars. Two cars were worked at a time with two men shoveling to the cement buggies in each car and two men rolling from each car. The cement was weighed out, 622 pounds to a batch, on Fairbanks scales and the buggy rolled up to the dumping trap. As the batch trucks approached the cement platform they stopped and a man stepped from a platform onto the top of the batched aggregate and leveled off the material.

The truck driver spotted the body under the cement trap which was lowered over the body so that the canvas chute touched the aggregate. Then the buggy was slowly tipped to place the entire batch of cement within the chute. As the trap was raised the cement spread out over the batch and was covered with a roll of canvas by the driver.

Cutting the Grade

The grade was cut out by a New Aurora 8-foot blade grader pulled by a Caterpillar Thirty tractor, windrowing the material to be thrown out by hand. Where the sand cushion was placed it was windrowed down the center of the finished grade between the forms and the batch trucks backed down one side and drove out empty on the other side. The sand was spread by hand under the skip, using about a dozen men to save time. To smooth out the sand quickly the contractor used the standard long handle concrete finishing float after the steel was set and the steel men were outside the forms.

Forms and Fine Grade—Steel

Four men on a side for each shift dug the trench for the forms and then went back and set the 10-inch Blaw-Knox steel forms. A form liner and three men followed up while a Buffalo-Springfield 5-ton gas roller compacted

(Continued on page 29)

Road Stabilized with Salt in Michigan

Experimental Sections Show 8 Tons per Mile of Sodium Chloride Produce Good Results

By E. E. BLOMGREN

Maintenance Engineer, Michigan Highway Department

THE Michigan State Highway Department, having stabilized approximately 40 miles of gravel roads by the addition of clay and calcium chloride in the proportions determined by laboratory tests, was approached in September 1933 by several companies selling sodium chloride to conduct an experiment with the use of this salt to determine whether or not it would be efficacious.

At the time nothing was known as to its merits or as to the proper proportions of salt in order to obtain satisfactory results. It was therefore decided to stabilize a gravel road, dividing it into sections, using a different amount of salt for each section and using calcium chloride on one of them in such quantity as was known to give satisfactory results. By doing this all portions of the road were exposed to the same type and amount of traffic. The results therefore would be a true comparison and the calcium chloride section would be the standard to which the other sections could be compared.

Section of Trunk Line Selected

A section of trunk line, M-9 south of Eaton Rapids 0.9 of a mile long, was chosen for this experiment because it had given considerable trouble due to the sandy base and the large amount of oversize gravel in the surface. Dur-

(Continued on page 16)

TVA'S NORRIS DAM



C. & E. M. Photo
The Federal Power Project As It Looks Today. See Other Photos on Page 40.

Native Limerock Base Used on Georgia Roads

By F. M. GARNETT
Division Office Engineer,
State Highway Board of Georgia

(Photos on page 40)

IN AN effort to reduce the cost of paving on highways, the State Highway Board of Georgia is constructing a number of types adapted to local conditions in different sections of the state. Limerock base with light surface treatment, originally developed in Florida, has been found well suited to heavy traffic.

Limerock is a soft limestone, having 80 to 90 per cent carbonates of calcium and magnesium. Most of the quarries are located in north central Florida, but a number of satisfactory pits are being operated in a region about 40 miles south of Macon, near Perry. Large deposits which may be developed commercially occur along the Savannah River between Savannah and Augusta.

The material is easily mined, usually being first lightly blasted, loaded by a power shovel, crushed to a maximum 4-inch size, and dumped directly into freight cars. Unusual care is required in stripping the overburden from the pits, as a small amount of clay or foreign matter makes it difficult to secure a satisfactory finish or proper compaction in the road.

Due to the differences in the physical properties of the Florida and Georgia stone, the specifications require that Florida limerock shall contain at least 97 per cent carbonates of calcium and magnesium, while Georgia rock is required to have but 80 per cent.

Drainage Important

Unusual attention to drainage and grading details is the first requisite of successful limerock base construction. When the grading survey is run, a complete drainage survey is also made, covering not only the drainage layout paralleling the road, but also the outfall ditches, which in many cases are from 2,000 to 6,000 feet long. The side ditches are usually an integral part of the grading section.

The grading section generally calls for side ditches with a minimum width and depth of 3 feet with 4:1 front slopes and 3:1 back slopes. However, the section is modified to suit local conditions and in middle and south Georgia, many of the ditches are only 2 feet deep. Limerock paving has been laid successfully in central Georgia with side ditches only 1 foot in depth.

In many cases drainage is carried 5,000 to 8,000 feet down the side ditches. As these ditches lower the water table through the flat sections where they are used, the profile grade of the roadway can be lowered accordingly. Also the materials from the ditches can usually be cast onto the roadway, eliminating long haul and the need for borrow pits, which generally form a problem in themselves.

Grading and Shoulders

Care is used in finishing and grading. It is customary to set eight grade stakes to each section, two on the roadway shoulders, four in the ditch bottoms, and two at the top of the slopes.

Shoulders and slopes are grassed with Bermuda sprigs under a specification calling for watering to insure satisfactory growth, and a liberal application of commercial fertilizer and nitrate of soda. A quick growth of grass is essential in protecting the edge of the limerock base and in preventing erosion of shoulders and slopes.

Preparing the Base

The usual limerock construction calls

Light Top Treatment On Prepared Stone Base Gives High-Type Road At Low Contract Cost

for a compacted thickness of 8 inches, with a light bituminous surface treatment. Where the subgrade has developed sufficient supporting power under traffic through the use of local selected material, a 6-inch base can be successfully laid.

In placing the 8-inch base, 2x11-inch form boards, firmly staked, are used in one-course construction. A recent development is a two-course base to secure maximum compaction. In this case, 2x9-inch forms are used. The subgrade is first road-machined roughly to grade. The forms are then set to correct grade. The subgrade is next brought to proper

grade and section by checking with a strike-off and scratch template, after which it is thoroughly rolled and watered.

With Florida rock, the trucks haul the rock as it is dumped, while the Georgia rock is back-dumped, and the trucks permitted to haul over the subgrade. It is not practical to haul over the Georgia rock as the material ruts badly in wet weather before the limerock sets up.

On single course construction, the rock is spread loose with rakes or shovels to a depth of approximately 11 inches for a final compacted thickness of 8 inches. A spread of 2.5 square yards per ton of rock is secured when laying an 8-inch compacted thickness.

A water line with a capacity of 30 gallons per minute is used on Georgia rock and 60 gallons per minute on Florida rock. Water is applied during the dumping of the rock with a 2-inch hose connected to the pipe line. Immediately following spreading and watering, the rock is rolled with a three-wheel 10-ton roller, run continuously over

(Continued on page 26)



Going Down! Duct Line Being Lowered to New Grade.

Thirty Tons of Ice on Construction Job

(Photo on page 40)

FORTY-EIGHT hours to go 20 inches sounds like a race for the slow motion championship between a couple of snails. The New York Telephone Co., which finds speed in handling calls effective, found, however, that slow motion was best for lowering a half-mile of vitrified clay conduit a distance ranging from 14 to 39 inches on Flatbush Avenue, near the Floyd Bennett Airport, Brooklyn, N.Y.

Because of the size of the job, the construction supervisors decided to depart from the standard jacking and lowering methods usually employed and to use melting ice in lowering the fragile vitrified clay conduit. The method worked most successfully with a minimum of duct breakage and resulted in a considerable saving in the cost of the work over those methods previously used.

Work Handled in Sections

The entire job was handled in sections. Each 500-foot length of conduit between manholes was lowered separately, and each section was first exposed down to the bottom of the concrete base. Pits were then dug under the ducts at intervals of 6 feet to a depth amounting to as much as 22 inches, depending upon the distance the conduit was to be lowered. In those sections where the lowering was considerable, the work was done in two stages, the maximum attempted in one operation being 22 inches. Vertical timber guides were provided to prevent the conduit with its protecting top and bottom slab of concrete from shifting sidewise on the ice. The guides also

Cable Conduit Lowered In Slow Motion Style Using Melting Ice Blocks Instead of Usual Jacks

prevented the conduit from settling faster on the side carrying the cables, the greater load on this side tending to melt the ice a little faster.

Tony, the Ice Man

The ice was delivered alongside of the trench by a local iceman who cut the standard cakes into blocks usually 11 inches wide by 22 inches long and of a height equal to the amount the conduit was to be lowered, which ranged between 14 and 22 inches for a single stage. The blocks were then placed in the pits beneath the conduit where they served as piers after the intervening ground was removed and leveled. As the piers melted, the conduit was lowered until it rested upon the new bed of the trench. The ground between the piers was removed in one or two layers or stages depending upon the depth involved. Where considerable earth had to be removed, this procedure permitted the entire section of the conduit to start settling sooner and also kept the lower portions of the taller piers of ice covered and insulated during the first half of the lowering period, thereby retarding the melting around the base of the piers which would otherwise have become much reduced in cross section toward the end of the lowering. While the earth was being removed, wire ties were placed around the structure to keep the base concrete from dropping off between the ice piers.

Old-Fashioned Road Show To Be Held by A.R.B.A.

The American Road Builders' Association will hold an "Old-Fashioned" Road Show in conjunction with its annual convention next January 20-24, in Cleveland, Ohio. The decision was reached by the Board of Directors of the Association after a poll conducted by the Joint Convention and Exhibit Committee showed that manufacturers and producers of highway equipment and materials were overwhelmingly in favor of resuming the Road Show.

The availability of Cleveland's new Exhibition Hall, in addition to the city's convenient location, swung the choice of the Convention City to Cleveland. The new exhibit area, in one building, is 461 feet long and 365 feet wide. Floor loading is unlimited and overhead clearance varies from 18 to 28 feet.

Officials of the A.R.B.A. announced that the convention will cover all major phases of the highway industry and profession, as well as present a Road Show where an opportunity will be given to contractors and engineers to see the great advances in the technical phases of equipment and materials since 1933, the date of the last Road Show.

Lowering Uniform

The time required for the lowering varied, of course, with the height of the piers and to some extent with the temperature of the air. A 14-inch block required approximately 48 hours and other heights in proportion. A total of 69,000 pounds of ice was used.

The lowering was quite uniform and an insignificant number of the trowelled joints of the conduit cracked in the process. During the period of melting, the preceding section was usually being backfilled and the next section was being prepared.

The ground consisted largely of beach sand which, while it facilitated the removal of the benches between the ice piers, tended to blow around and drift considerably, thereby requiring additional work in keeping the bed of the trench clear and level. The adjustment between the ducts at their new level and the manholes was made either by lowering the openings in the manhole walls, or by breaking the conduit joints and re-forming the subway section immediately adjacent to the manhole.

Personnel

This interesting work was handled by the regular construction force of the North Brooklyn Division of the New York Telephone Co., with A. Schaper as Construction Superintendent. In immediate charge of field operations was H. C. Young, Construction Supervisor of Subways, who worked out the details of the melting ice method, W. H. Coffey, Supervising Foreman, and J. J. Spinella, Foreman.



Unloading the Ice and Showing the Sheeting and Guides



Views of the TEXACO Sheet Asphalt pavement constructed on Farmington Avenue, a main thoroughfare of Hartford, Conn., by the Edward Balf Company of that city.

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Federation of Construction Industry Groups Has Best Features of Trade Associations

NRA died via the unconstitutionality route, but Industry has recognized that certain of its features must be salvaged if business is to endure without the threat of cut-throat competition. A group of high-minded men in the Construction Industry met recently and set in motion machinery which aims to create for the manufacturer, the dealer and the consumer a more equitable set of marketing conditions.

The Construction Equipment Association proposes ten objects which, summarized briefly, are: 1. To establish in itself a federation of trade associations and groups of manufacturers of construction equipment to express the majority opinion of its members on questions in which the Industry has an interest; 2. To set up fair methods of competition as far as existing laws may permit; 3. To act as the agency for arbitration of differences between members of the Industry; 4. To act as a clearing house of credit information; 5. To collect pertinent information and statistics; 6. To conduct a campaign of education to secure voluntary adherence to fair methods of competition without resort to compulsory methods; 7. To defend the Industry against discrimination or aggression, and to encourage legislation beneficial to the Industry and oppose detrimental legislation; 8. To cooperate in improving relations between manufacturers, dealers and consumers; 9. To encourage and aid any group of manufacturers to form its own trade association that it may become a unit in the Construction Equipment Association; and 10. To carry on any other lawful activities in the interest of the construction industry.

In many of the Codes born under NRA self-interest emerged to an alarming degree. Some groups sought to consolidate their dominant positions to such an extent as to make them impregnable to advances of new brains and new capital. Others sought such a high degree of credit protection as almost to choke off the possibility of future purchases of new construction equipment by contractors, other than the very largest.

The voiced intent of the new Association, indeed the very names of the members of the Organizing Committee*, insure a fair-minded approach to the problems of the Industry as a whole and not discriminatory to any group or individual from producer to purchaser.

*Chairman, S. F. Beatty, Austin-Western Road Machinery Co.; Morgan Butler, Butler Bin Co.; C. L. Danham, Sullivan Road Machinery Co.; George M. Etnyre, E. D. Etnyre & Co.; W. B. Greene, Barber-Greene Co.; O. G. Mandt, Jaeger Machine Co.; J. R. McGiffert, Clyde Iron Works; Wm. Parrish, International Harvester Co.; and L. W. York, Pioneer Gravel Equipment Mfg. Co.

Sour Spots in "Principles" of Secondary Road Program

The set of "principles" promulgated by the Secretary of Agriculture for the expenditure of funds from the Emergency Relief Appropriation Act of 1935,

for the building of secondary roads, starts off with a Number One fallacy. It states, "1. Availability in any area of employable relief workers of appropriate skills shall be the primary precedent to allotment of funds for construction of secondary or feeder roads in the area." So, no matter how much you need an improved road to get your farm products to market in the muddy season, unless you have plenty of "skilled" unemployed highway workers you are out of luck.

Then the second requirement considers the economic and social effects of improving the secondary road. There is a warning note here telling the road man that if the improved road might make the territory more livable he is to ignore the need of the road if it is within the territory that the New Deal has labeled as "submarginal" and hence considered unworthy of aid.

After these two anachronisms the requirements go on quite rationally and show that the intelligence of trained highway engineers, probably the influence of the Bureau of Public Roads, has been brought to bear on the "principles." Preference is to be given to roads that connect farms and rural homes with railroad points, schools, churches and other points of public congregation.

The next requirement is that "sections of secondary or feeder roads proposed for improvement shall connect with the previously improved highway system, and preference shall be given to projects that connect with the improved system at two ends." An admirable provision. The fifth "principle" requires that there be some demonstration of the need of the improvement such as existing impediment or hazard to travel at any season, and/or excessive maintenance of the road in its present state. This is followed up by the requirement that the work shall effect a "substantial improvement" in the roadway and that work properly classifiable as maintenance will not be allowed. Thus it is insisted that the work be of some permanent value and not merely used to relieve the community of the cost of maintenance for the current year. In "principle" ten the authorities legally charged with the administration of the secondary road are required by specific agreement to maintain the road after improvement.

The final "principle" very effectively states, "It is not contemplated under this direction that the high standards of construction ordinarily established for trunk-line and State highways shall be carried over into work on secondary or feeder roads, but it is anticipated that the work done shall result in material betterment of the existing condition." And provided there are enough workers handy to do the job?

We have constantly insisted that Federal money should be expended so as to assist the greatest number of people,

Where the Money Went at Hoover Dam

Materials and Services
Amounting to Over \$50,000
Were Purchased from Each
of Forty-Seven Companies

MACHINERY, lumber, concrete and steel—these were the materials which the casual observer saw on his visit to Hoover Dam. But he may not have seen the 32,664 canvas water bags, 23,144 pairs of rubber boots, 19,384 paint brushes, 355,000 gunny sacks, 13,356 shovels, 86,968 hack-saw blades, 1,291,550 machine bolts, 7,360 flashlights, 495 miles of manila rope, 13,046 "hard-boiled" hats or 12,912 water buckets. Yet all these and many more went into the construction of Boulder Dam, according to a recent article in *The Reclamation Era*.

From brooms to dynamite caps, Hoover Dam required a myriad of things, often by the carload. Six Companies, Inc., contractor for the project, have compiled a list of 47 companies, each of which furnished supplies or services amounting to more than \$50,000 and these firms are spread from the Atlantic to the Pacific.

The Bureau of Reclamation during the same period purchased \$20,558,823.79 of cement, structural and reinforcing steel, gates and machinery for the dam. Steel and machinery came from Pittsburgh, Birmingham and Newport News; cement from California, Utah.

Up to June 1, 1935, Six Companies had used 4,938,118 gallons of gasoline, 522,757 gallons of lubricating oil, and 777,755 pounds of greases. They also used 8,551,300 pounds of dynamite, 915,000 feet of fuse, and 1,139,500 exploders.

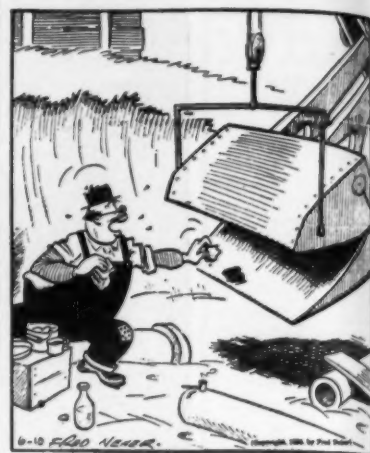
Spread of Purchases

The contractor's major purchases came from Arizona, California, Illinois, Indiana, Maryland, Michigan, Missouri, Nevada, New Jersey, New York, Ohio, Oregon, Pennsylvania, Utah and Wisconsin.

A break-down of the Bureau of Reclamation's larger expenditures for materials shows that \$620,535 went to Los Angeles; \$1,049,395 to Birmingham; \$10,908,000 to Barberton, Ohio; \$172,110 to Elizabeth, N.J.; \$124,684 to Newport News, Va.; \$65,186 to Rockford, Ill.; \$2,405,367 to East Pittsburgh; \$105,989 to Susanville, Calif.; \$1,883,217 to Milwaukee; \$2,185,415 to Schenectady, N.Y.; \$2,086,000 to Southern California cities; \$148,160 to Denver; \$419,191 to Gary, Ind.; \$46,090 to Muskegon, Mich.; \$107,023 to Niles, Mich.; \$108,430 to Chicago; \$298,048 to Philadelphia; \$547,825 to San Francisco; \$62,377 to St. Louis; and smaller amounts to more than a dozen other communities.

While to most people, the construction of Hoover Dam seemed a remote and isolated activity, there is hardly a section of this country which was not benefited, either directly or indirectly, by the expenditure for this project.

and in this case if there is an outstanding need for a farm-to-market road in a community where there are not enough skilled workers to provide the necessary labor, let the community be big hearted and import unemployed men from the next county and board and lodge them for the period of the work, charging the cost against their wages. We have become, through the patronage-conscious Federal government, too narrow-minded in the expenditure of nationally-collected funds. They should be used for the greatest number and the greatest good on long-lived improvements.



Courtesy of Consolidated News Features, Copyright, 1935 (Near-Sighted Workman) "That's all you get now . . . go away!"

These Men Know Our Roads

Each week day 43,000 mail carriers use 1,250,000 miles of highways for the delivery of mail to 30,000,000 rural population. The total number of miles of highways in the United States is 3,040,000 miles, from which it is apparent that the mail carriers traverse more than one-third of the nation's total rural highway mileage each day.

Information supplied by the National Rural Letter Carriers' Association to the American Road Builders' Association discloses in plain terms the highway penalties that rural letter carriers still must pay as they traverse their daily routes. A questionnaire sent out by the A. R. B. A. brought 1,801 replies from 47 states, disclosing a number of interesting facts, which were presented by Charles M. Upham, Engineer-Director of the American Road Builders Association in a paper at the convention of the National Letter Carriers' Association.

The average route traveled by rural mail carriers was 37.9 miles, of which the average mileage of hard surface was 7.5; the average mileage of improved roads was 12.0; and the average mileage of mud roads was 18.4. These 1,801 carriers reported 1,530 unbridged streams. They listed mud as the greatest single obstacle to travel, with the allied obstacles of snow, rutted roads, and bad drainage as close runners-up in causing inconvenience and extra expense.

Bad roads made necessary the use of horses on 17,703 days for these 1,801 carriers, or an average of 32.2 days for each carrier. Prevalence of deep ruts was indicated by reports of more than 50 per cent of the carriers.

True Cross-Section of Conditions

The conditions that prevail for the rural letter carriers represent a true cross section of country road conditions in America. Figures obtained from reliable sources show that 42 per cent of the American farms are located on unimproved roads.

Of the total 3,040,000 miles of highways in the United States, only 920,000 miles have been improved, and of this only 160,000 miles have been improved with high-type surfacing. Thus, there are more than 2,000,000 miles of highways untouched so far as systematic development goes, and a large part of the mileage receives no attention other than make-shift community work.

Twenty-five per cent of the \$200,000,000 recently allotted from the Emergency Relief Funds was designated for secondary roads. Furthermore, the Works Progress Administration is now engaged in setting up a Farm-to-Market road program. The primary interest of the WPA in such a program is to provide employment.

But the need for the improvement of farm roads extends beyond the immediate, pressing demand for jobs. The Farm-to-Market road program must be established and maintained as a regular part of the Federal road program.

Industrial Railway Spans "Bottomless Hole"

(Photo on page 40)

HOW rapidly the word travels by the contractors' "grapevine" that "Jones & Smith are licked on that slide" or that "Robinson & Johnson can't find any bottom in that water hole." Such a report was current in the south and southwest concerning the unusual condition existing on the north approach fill for the Bonnet Carré Spillway highway bridge about 30 miles north of New Orleans for which Gifford-Hill Co. was contractor.

The story of the construction of the Bonnet Carré Spillway is quite well-known but there seems to be some lack of memory, or of records extending back to 1885. In that year the whole area, covered by the remarkable structure that now protects New Orleans in case of exceptionally high water in the Mississippi River by diverting it through a floodway between two lateral levees around the city and into Lake Pontchartrain, was swept by flood waters and a large section remained under water for as long as four years. The floodway section was part of that area. During the construction of the lateral levees a year or two ago, material for them was taken from borrow pits within the floodway section. One of these pits was 50 feet deep, 320 feet wide and extended for several hundred feet on either side of the center line of the fill at the site of the new highway bridge.

And this is the "bottomless" pit, dredged out by standard equipment to a firm clay, into which rumor said that Gifford-Hill was dumping untold, yea, countless yards of dirt, and not knowing where it was going. Actually the contractor very readily controlled the location of the material once it had been placed in the water and the loss of material was practically negligible. The method of spanning the 320-foot hole in order to place the dirt was really the feature of the job.

Floating Track in a Lotus Pond

The old water hole made by man had become closely covered with lotus or water hyacinth so that to the casual observer it might have been a meadow. Driving piles and erecting a trestle across this 50-foot hole would have been costly so the contractor devised a floating track that was pushed out across the hole as the fill progressed.

A group of 10x30-foot steel pontoons were built that could be lashed together to give sufficient buoyancy to carry loaded trains and strings of empties. First a pontoon consisting of three of the small units was floated from the north shore and five stringers of 8x16-inch fir 54 feet long attached to carry narrow-gage 36-inch track. Beyond that a 20x30-foot pontoon, also connected with the larger pontoon by similar stringers, but using only three, was floated among the water hyacinths. Only three stringers were needed between the outer and inner pontoons as they were called upon only to support strings of empties as the train was always dumped between the shore and the first or larger pontoon.

When it was necessary to move the floating equipment farther from shore a flat car with a boom extending 25 feet out from the car and operated by a 5-ton National hoist lifted the 5-stringer section clear of the fill and pushed the entire floating section out 25 feet. Then a new section of track, which was made up in 25-foot sections, was inserted and the track connected up ready for service.

As it was necessary frequently to cross the water hole, a floating board

Gifford-Hill Co. Used Pontoons to Carry Track on Approach Fill for Louisiana Bridge

walk was built on logs, and with a hand rail, for laborers to use. This walk was on top of the water hyacinth, which was closely matted.

It was necessary to cut the mat of roots and get the growth out of the way for the width of the fill. This was done by dragging a cutting tool across the water hole by a National hoist powered by a Hercules motor at one side and a steam rig on the other side. These cutters or "combs" tore out a section of the roots and the material floated out from the fill.

In order to restrict the area of the base of the fill the contractor placed a barrier of old waterlogged timber at the toe on the east side of the fill, which was effective in preventing loss of material. It was not found necessary to do this at the west toe. The fill for the underwater section is a 5:1 slope starting 2 feet above water level with a 20-foot berm between the underwater slope and the 3:1 slope for the material placed in the dry. The material in the bottom of the water hole was found to be a tough clay with very little muck overlying it.

The south approach was included in the same contract and also had water holes but they happened to be so located that the approach fill ran between them and also they were not as deep as the hole at the north approach.

Stories of the Borrow Pits

At the request of the U.S. Engineer Office the specifications required that the material for the fills come from within the floodway area between the two lateral levees. Accordingly the con-

tractor cleared a wide path through the heavy stand of 6 to 8-inch timber and thick undergrowth from the right-of-way to a large borrow pit within the prescribed area. After working it for about 10 days, constantly moving his dragline equipment trying to find a better location and only succeeding in loading out about 5,000 cubic yards, the contractor asked permission to secure the borrow from outside the area. He had struck a mat of old logs and stumps uniformly 3 feet below the surface and it was impossible to break through this tangled mass except at prohibitive expense. Finally permission was granted and a new borrow pit in cultivated land, a cabbage patch, was secured.

The second pit at the north end had from 12 to 14 feet of river silt and sand below which was found a typical black ground showing intensive cultivation before the levee break of 1885. The stumps in the borrow pit all started from the old level and were uniformly

(Continued on page 18)



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Trouble in Starting Truck Engines

By FREDERICK W. KOERBER

Although difficulties in starting truck engines are usually more numerous in the winter months, due to battery troubles and the cold temperature of the oil after standing idle for a time, there are other causes which can delay starting at any season of the year.

Difficulty in starting may be either mechanical or electrical. If the starter is heard to engage but does not turn the engine over, or if the starter turns the motor over slowly, and then stops, the trouble is most likely to be electrical.

The clutch should be held out when using the starter and the gear shift lever should be in neutral when endeavoring to locate starter trouble.

1. The storehouse of energy is logically the first place to look for starter trouble, for the battery, 50 percent of the time in winter, is the direct cause of starting difficulties. If the lights dim or go out when the starter button is pushed down, the battery is weak and should be recharged and tested for dead cells.

2. Battery connections should be examined. If corroded, clean with sandpaper and ammonia; then cover with vaseline and fasten securely.

3. The ground connection may be loose or broken. Either tighten or replace.

4. Examine starting switch connection for loose wire. Tighten. Short-circuit by holding screw driver or heavy wire to the two connections while starter button is down. If switch is defective, starter will then function.

5. Look for defective insulation of wire as this will, if it comes in contact with frame, quickly sap the power from the battery. Broken wire, of course, must be replaced.

6. Next remove the cover over the brushes of the starting motor. Test the brushes for a firm contact and if the commutator is burned black, clean with No. 00 sandpaper, until it shows a copper-colored polish.

7. If the starter spins without turning over engine, the spring may be broken, in which case it must be replaced. If the bendix drive is gummed, wash clean with gasoline.

8. At times, the starting pinion may bind on the fly-wheel gear, thus preventing the turning of the motor or even the cranking thereof. Put gear shift lever in high and roll car forward, which in most cases disengages it. Then put lever in neutral before using starter again. Sometimes it is necessary to loosen bolts holding starter housing to frame before pinion will release.

9. When the starter takes hold occasionally but sometimes merely spins, it is an indication that the clutch rollers are worn. Replace.

Petter Supply Co. Appointed Link-Belt Distributor

The Henry A. Petter Supply Co., of Paducah, Ky., was recently appointed by the Link-Belt Co., of Chicago, distributor for Link-Belt crawler-mounted shovels-cranes-draglines and track-type locomotive cranes. This company is headed by Stanley D. Petter, and for 45 years has served the needs of contractors and industrial plants.

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Now with ditching jobs coming back, here's equipment that will earn real profits! Why? Because we're offering these modern machines at the lowest prices in our history. They're reconditioned, ready to go to work for you. They're built for big production: Main machinery is in single cast steel case for huskiness; boom crowding device is independent of hoisting mechanism for greater flexibility; 3-speed sliding gear transmission for bucket line; 3-speeds for high gear traction; safety slip clutch at the point of shock protects mechanism from disabling jolts. They're modern in every respect. Pick one now while the assortment is best. Write or wire for complete details.

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Milwaukee, Wisconsin

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A One-Man Maintainer Owned by Driscoll Construction Co. on a Road-Oiling Contract West of Walsenburg, Colo.

Oiling Roads by Contract In Colorado

Last year the Driscoll Construction Co., of Pueblo, Colo., one of the large contracting organizations of the state, was awarded the contract for a big road-oiling project west of Walsenburg, Colo. On this job the contractor used several maintainers operated by McCormick-Deering power for mixing the oiled top. Tanks mounted on International trucks

were used for hauling the oil to the job and distributing it on the highway.

In addition to this project, Driscoll Construction Co. rebuilt 30 miles of north and south U. S. Highway No. 85, including the construction of one large bridge and several small bridges, a railroad underpass and one of the largest rock cuts ever made for a highway in the state.

Fillers for Brick Paving Tested in Ohio

The new types of filler for use in brick pavement construction which were developed in the laboratory of the Research Bureau of the National Paving Brick Association at the Ohio State University Experiment Station will be tested in actual service in a brick pavement now under construction under the supervision of the U. S. Bureau of Public Roads and the Ohio Highway Department on Ohio Route 31, the Columbus-Athens Road in Hocking and Fairfield Counties.

There will be fifteen sections of brick pavement, each about 500 feet in length, in which the different varieties will be used. Observations of all tests will be made and recorded.

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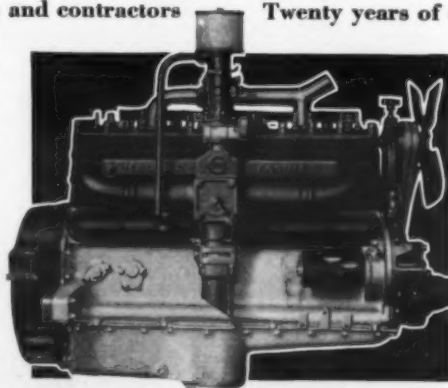
have learned through long experience that "Hercules" on an engine stands for efficient industrial power—either gasoline or Diesel.

Heavy-duty industrial equipment using Hercules power as standard includes air compressors, concrete

mixers, cranes, ditchers, dredges, shovels, pumps, pavers, rollers, scrapers and scarifiers as well as many leading makes of trucks and tractors.

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twenty years of studying and improving these engines, twenty years of observing them under all service conditions in the field, lie back of the compact design and dependable performance of all Hercules Engines today.



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Fighting Ice Storms on Connecticut Roads

By G. E. HAMLIN
Deputy Commissioner for Maintenance,
Connecticut State Highway Department

(On the day following Washington's Birthday last winter an ice storm swept through New England, coating telephone, telegraph, and transmission wires with a heavy covering of ice, outlining the bare limbs and twigs of every tree and bush and spreading over the highways a treacherous layer of ice. The Editor drove over 150 miles on state highways in Rhode Island and Connecticut early in the day, noting with satisfaction the effective work of the Maintenance Department of the State Highway organizations of these two states. The following article describes the organization which made safe driving possible in Connecticut. The methods and organization of the Rhode Island Board of Public Roads will be discussed in a later article.)

For a number of years the Connecticut State Highway Department has included in its service program the sanding of highway surfaces under icy conditions in locations which may be particularly hazardous for driving. This is in addition to the snow removal program, and may follow snow removal or be put into operation when the thermometer drops below the freezing point following a rain. This program is under the Bureau of Maintenance, and is operated through eleven maintenance supervision districts into which the State is divided. Each of these supervision districts is under the direct charge of a maintenance district supervisor with headquarters in the district area, and under whose charge comes the operation of all trucks and men in that district.

Trucks Always Ready

The number of trucks in operation, any or all of which may be detailed for sanding, is approximately 275. Each truck is under the direct orders of a maintenance district foreman who reports directly to and receives orders from the maintenance district supervisor. The number of men assigned to each truck varies in accordance with the conditions of the particular locality. In general, however, a driver with three men constitutes a unit for this work.

Trucks are garaged at locations convenient to the particular section to which they are assigned. In some districts where conditions permit, a central garage has been established and the larger number of trucks in this particular district make their headquarters in this central garage. If, however, the distance to an outlying section may be too great to cover quickly, additional garage facilities are rented so that necessary service may be furnished with minimum delay.

In general each truck covers an assigned area. Under abnormal weather conditions, however, trucks are transferred outside of the assigned district when necessity requires.

Sanding as a Follow-Up of Snow Removal or Freezing Following Rain—a Safety Measure

During the summer and early fall sand stockpiles are established throughout the State at locations where reloading of the trucks can be conveniently and quickly accomplished. Under the necessity of continued sanding operations, depleted stockpiles are kept renewed by the addition of material hauled by trucks from the nearest sandbank. Each truck carries a load of sand when being placed in the garage at night, so that a truck is ready for immediate operation when icy conditions occur during that period.

Telephone service is maintained at the homes of all foremen so that immediate communication can be had between the foremen and the supervisor at all times.

24-Hour Service

While necessary sanding is done during daylight hours, the greater majority of this work is required during the night, and especially in the early morning hours, in order that satisfactory driving conditions may be furnished at all times. Trucks are therefore dispatched when conditions warrant, either day or night, and are continuously operated until the sections to be sanded are safeguarded. With rain freezing as it falls, it is frequently necessary to cover the same areas many times during any storm.

Some sand is spread over the travel path by machines of the rotary disc type which may be combined with the belt conveyor attachment. In general, however, the larger portion of the sanding is done by handspreading directly

from the trucks, as it is believed that windrows of sand, as thrown from shovels, furnish better tractive resistance
(Continued on page 33)

THE NATIONAL CARBIDE V-G LIGHT

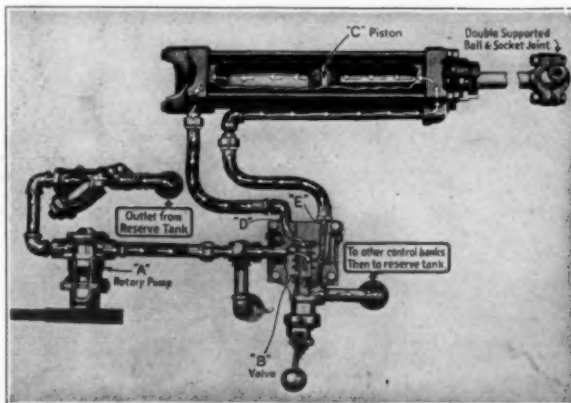
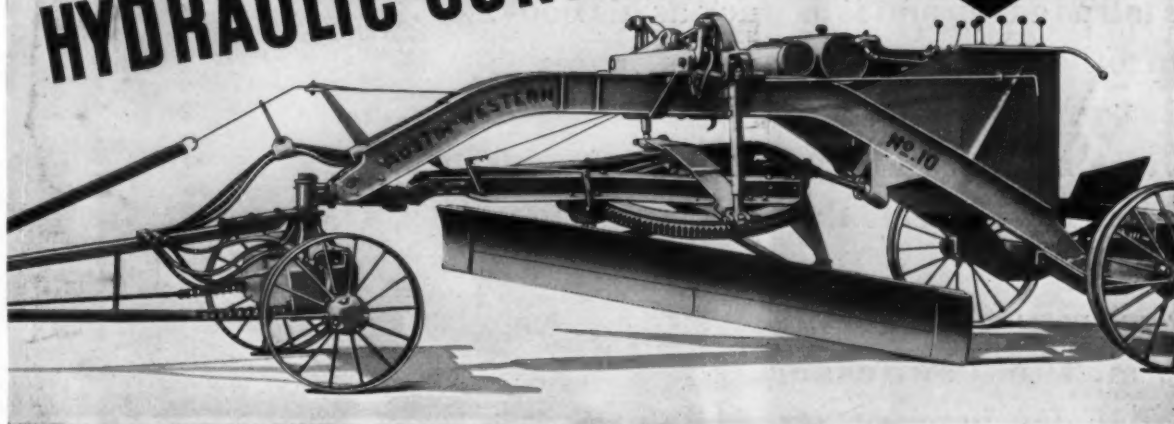
Gives you daylight conditions on night jobs. Spreads a full, even beam of 8000 candlepower right where you need it.

Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 98 lbs. when full. Write for catalogs on V-G Light, V-G Handy Light and Lantern.

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With this improved control system the operator can now raise and lower, reverse and side shift the blade—lean front or rear wheels, shift frame on rear axle and steer, all by a touch of the control valves.

Anyone who knows blade graders will realize the time saved and the increased speed which must result when every mechanical operation is under instant and accurate control. Anyone who has bossed a job will know how energy saved the operator results in more efficient work.

Simplified hydraulic controls when combined with such outstanding design features as one-piece girder frame, direct draft from tractor to blade, and complete blade visibility make the Austin-Western Grader outstanding—the most economical buy for the man who must get results at lowest cost.

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In every Firestone Tire, it is the Firestone cord body made stronger—more flexible and blowout-proof by Gum-Dipping, and the Firestone Non-Skid tread, scientifically designed for maximum traction and

safety in its particular service, which have earned for Firestone Tires the reputation of giving lowest cost per mile.

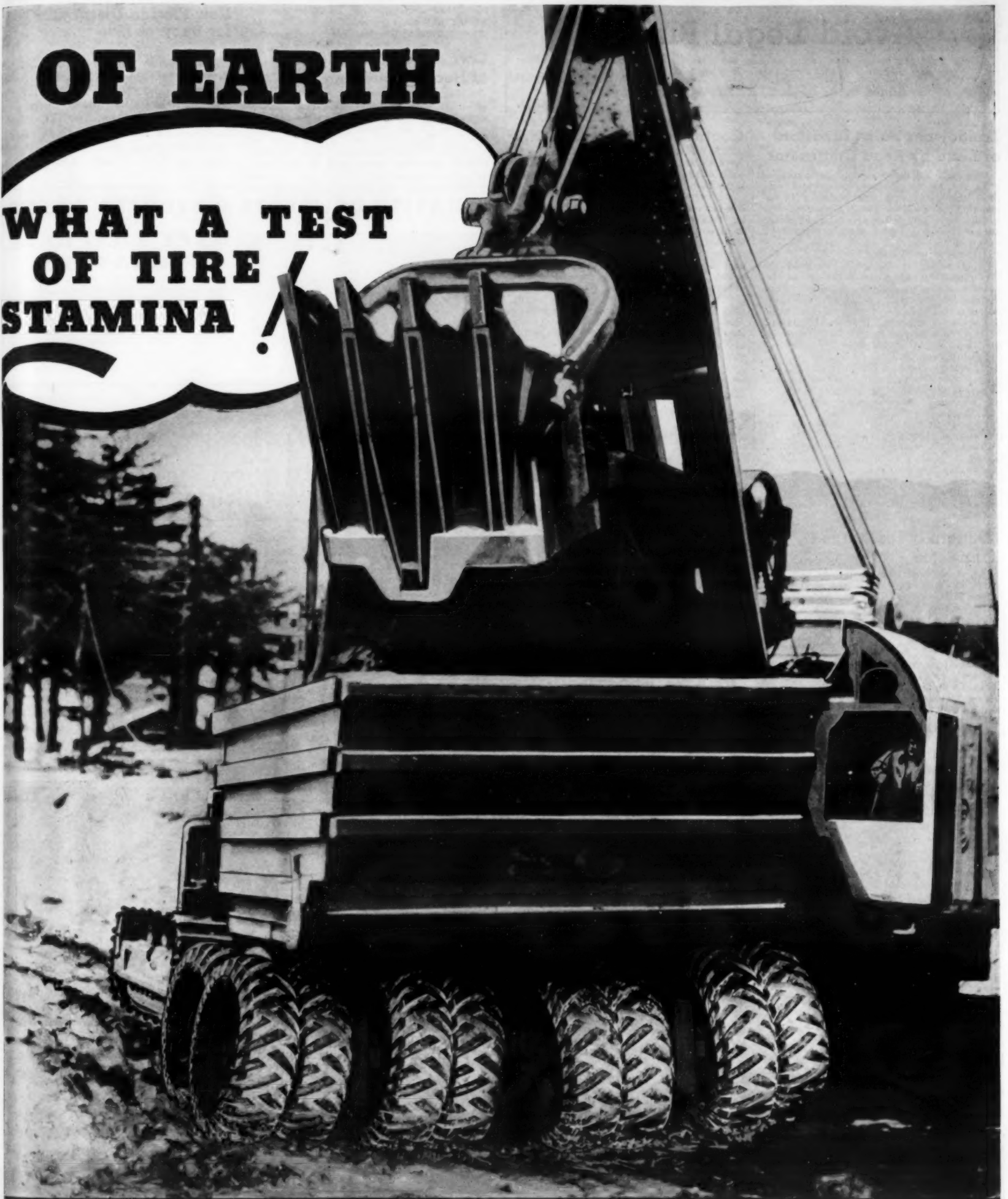
No matter what your type of service—light or heavy hauling, short runs or cross-country schedules, there is a Firestone Truck Tire to give you lower operating costs and more dependable service.

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Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Landowner Balks Invasion of Land by Road Contractor

"We supposed that we could park grubbed roots, etc., on the adjoining ground and leave them there," insisted subcontractors in attempting to avoid a grading contract into which they had entered. "The adjoining owners refused to let us do that. So that let us out of our contract, which thereby became impossible of performance."

"Your excuse is not good," declared the Washington Supreme Court in the case of McBride v. Callahan, 24 Pac. 2d, 105. "Your contract required you to remove all organic matter from the highway. This you could do by burning it or hauling it away. If you saw fit to enter into the contract on a bare expectation that the adjoining owners would not object to having the material dumped on their land, you can not complain of additional expense occasioned by the landowners refusing to permit this. That performance of a contract becomes burdensome or unprofitable, through unexpected difficulties, does not make the agreement impossible of performance in the sense of excusing nonperformance."

Moral: It is not a bad idea for a contractor, or subcontractor, who counts on being able to dispose of waste materials at a certain advantageous place to get a written contract or permit assuring the place to him, before he makes a contract on the basis of the expectations.

Wrongfully-Discharged Contractor

"When an owner inexcusably discharges a contractor after the latter has partly performed his contract, how much money is the contractor entitled to?" is a question that was asked of the Appellate Division of the New York Supreme Court in the case of Farm Supplies Corp. v. Goldstein, 270 N. Y. Supp. 430.

Answered the court: "The measure of damage would be the entire contract price after deducting the installments already paid and the amount which it would cost to complete the work."

Sunstroke Not an Accident

A night watchman employed by contractors walked two miles from his home to his job late one summer afternoon. Some time after arriving at his place of work, he collapsed and later died. The doctor said it was sunstroke.

Denying the surviving wife an award under the Pennsylvania Workmen's Compensation Act, the Pennsylvania Superior Court decided that there was no proof that the sunstroke resulted from any condition under which decedent was employed. It was more probable that the sunstroke was due to the long walk than to his slight exertions after arriving on the job (Howey v. Peppard Bros., 164 Atl. 920).

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Contractor Caught in a "Net"

"The owner agrees to pay the contractor \$10 for each net cubic yard of stone laid in the walls of the said two buildings," read a Kentucky building contract.

On completion of the job, the contractor insisted that under a general custom prevailing in the local stone trade he was entitled to be paid on the basis of measurement without deduction for openings less than 6 feet square, and to have all corners measured double.

The Kentucky Court of Appeals decided (Francis v. Domino, 64 S. W. 2d, 571) that the contractor's contention could not be upheld, in view of the use of the little word "net". The decision follows the well-established rule of law that where a trade custom and an explicit agreement meet head-on, the explicit agreement has the right-of-way.

For the contractor to avoid the effect of the contract as written and signed, it would

have been necessary that he show that the writing did not express the true agreement, through fraud of the owner or mutual mistake.

Owner Not Liable for Cost of Heating Building

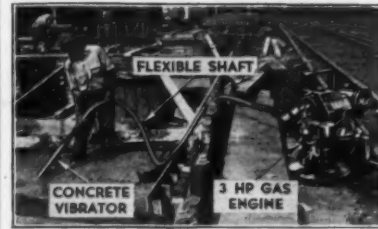
A contractor is not entitled to charge a building owner with the expense of heating it while such work as plastering is being done, according to the decision rendered by the Missouri Supreme Court in the case of Schroeter Brothers Hardware Co. v. Croatian "Sokol" Gymnastic Assn., 58 S. W. 2d, 995.

New Florida Distributor for Bucyrus-Erie

The Florida Machinery Corp., 2315 N. Miami Ave., Miami, Fla., has recently been appointed distributor for the Bucyrus-Erie Co., in the southern part of Florida. This company will handle Bucyrus-Erie shovels, draglines, cranes, clamshells, drag shovels and skimmer scoops in 3/8 to 2-yard capacities.

QUALITY CONCRETE at REDUCED COSTS!

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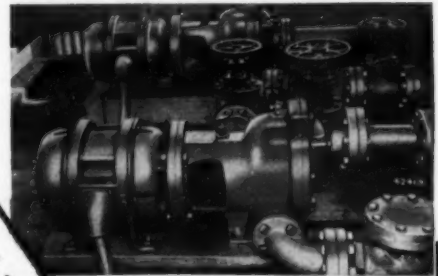
-An Ingersoll-Rand Product

MANY Motorpump installations in mining and contracting work have proved the worth of this sturdy unit. It is built in a wide range of sizes and types, and is well suited for the many pumping jobs of these fields.

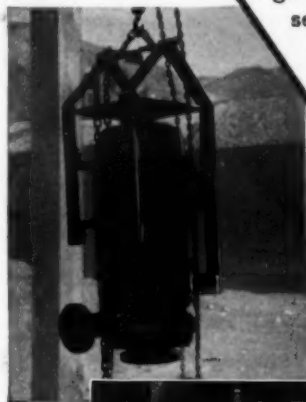
For shaft sinking, a standard single or two-stage unit is used with the sling-yoke arrangement. For gathering service the Motorpump is self-priming and may be equipped with variable voltage D. C. Motors.

In contracting work there are single or two-stage units which will handle from 5 to 1,000 GPM against heads up to as high as 500 feet. All units are available with any type of motor and for all usual current conditions.

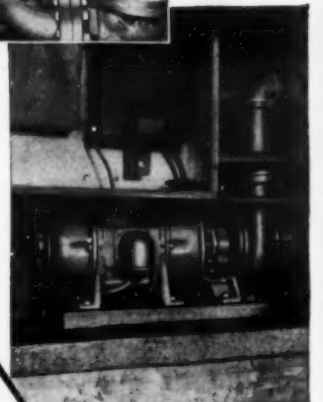
Equipment for use in either the mining or contracting industry is naturally subject to heavy duty. It should be light in weight, easy to move and to install, simple, and rugged. The Motorpump is designed and built for this service.



Two 2-stage units on a large construction job.



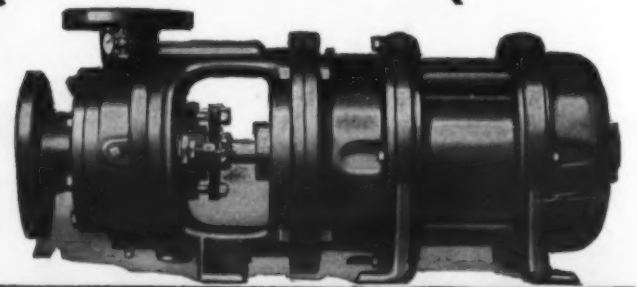
Motorpump equipped with sling yoke for shaft sinking service.



Motorpump used for dewatering a gopher dam.



Self-priming unit in a coal mine.



171-9

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Picks and Shovels

(Continued from page 1)

you that I picked up your Am. Soc. C. E. pin in the 84,000-yard borrow pit at Clendening Dam a day or so after you were out there. Somehow or other, the tractors, wagons and the rest of the equipment carefully avoided it, and I have it here for you."

So from now on, the Editor believes in miracles.

How Do They Do It?

Life is full of surprises, particularly the life of a contractor. Far too often these surprises are concerned with the work under way, but occasionally the

surprise, though occurring on the job, merely goes to prove what a strange thing nature is.

During the construction of the approach fills for the Bonnet Carré spillway highway bridge, in Louisiana, it was necessary to start several borrow pits. One of these, located at the north end of the job, filled slightly with water, for perhaps a foot or two in the low spots, through seepage and some rainfall. After a few weeks, small trout were found swimming around in the small pools. No one knows how the fish or the eggs (which comes first?) reached the place but it is known that this frequently happens in borrow pits in the south.

In fact, in a concrete-lined pool at the needle dam of the Bonnet Carré

spillway, trout were found soon after the basin filled with a slight depth of water.

Two-In-One Demolition Tool Announced by Worthington

A powerful easy-running breaker for heavy demolition and similar work, known as the Worthington No. 10 Master breaker, which is convertible also into a useful sheet piling driver called the Worthington No. 10 SD Master sheeting driver, has recently been announced by the Worthington Pump & Machinery Corp., Harrison, N. J.

This double-duty tool, of sturdy construction, is useful for the heaviest

classes of concrete breaking, general demolition work, crushed rock tamping, ripping up pavements, loosening hardpan, and in its converted form for driving sheet piling.

If desired, either the breaker or the sheeting driver may be purchased as a separate unit. The net weight of the breaker is 82 pounds and its overall length, without tools, is 29 inches. The net weight of the sheeting driver is 120 1/4 pounds and its length is 28 3/4 inches. The steps of the driver are adjustable and removable. The standard head is for 2-inch sheeting but when specified, heads are furnished for 2 1/2 and 3-inch sheeting.

Bulletin W-1200-B12, fully describing and illustrating these units, is available free upon request direct to the company.



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WHATEVER the time of year, Adams Motor Graders are ready to serve you efficiently and economically.

They have traction and power to "go through" on soft footing in spring . . . they have rigidity and stamina to scarify hard summer roads . . . they have power and capacity to handle road-mix properly . . . and, equipped with Adams Snow Plow, they help keep roads open in winter.

No matter how tough the job may be, an Adams Motor Grader can "take it." The frame is a strong, solidly-welded unit, designed for utmost strength and rigidity. Machine-finished throughout, with

adjustability for wear, an Adams grader will serve you long and well.

Mail the coupon at the right for new motor grader catalog which more completely describes these machines. Use the coupon also to inquire about Adams Elevating Graders, Leaning Wheel Graders, Multiple-Blade Maintainers, Retread Pavers, Rotary Scrapers, Dump Trailers, etc.



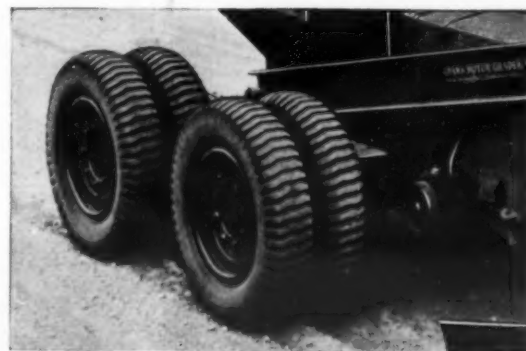
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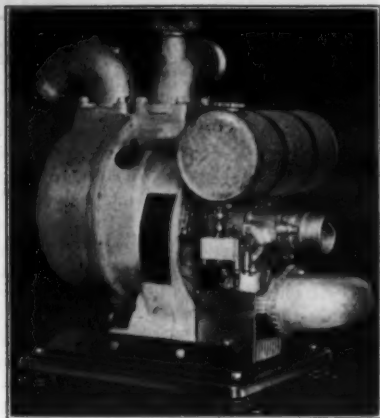
• Adams Snow Plow, readily attached to any Adams Motor Grader—old or new—handles 10 to 12 inches of snow easily.



• Adams Tandem Drive, with 4 or 8 drive wheels, provides positive traction when the load is heavy, or the "going" soft or uncertain.

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The New Homelite Pump Easily Carried by One Man

Light-Weight 3-Inch Pump

A new fully-portable self-priming centrifugal 3-inch pump has recently been announced by the Homelite Corp., 75 Riverdale Ave., Port Chester, N. Y. One man can easily carry this pump, which weighs only 88 pounds complete with a built-in air-cooled gasoline engine. The pump, which is built to handle muddy water with solids, handles 15,000 gallons per hour and has a guaranteed suction lift of 28 feet.

The main parts of this pump, such as pump body, crankcase and end plate, are made of a special abrasion-resistant aluminum alloy that weighs only one-third as much as cast iron. It is sturdy, weatherproof and is claimed not to overheat or freeze.

Compact and convenient, this portable pump can be readily stored in a contractor's tool box, carried in an ordinary passenger car or tucked in an out-of-the-way corner of a truck.

An illustrated bulletin describing this new piece of equipment may be secured from the company.

Convention Proceedings of A.R.B.A. Published

The 1933-34 Convention Proceedings of the American Road Builders' Association, including a number of reports in full, has recently been published. The reports contained therein cover stabilized gravel roads, the use of concrete for low-cost road construction, reinforced concrete pipe culverts, corrugated metal pipe culverts, and the use of emulsions for road construction and maintenance, and others.

Copies of this volume are available from the American Road Builders' Association, National Press Building, Washington, D. C. Price: \$3.00.

The Insley Ditcher will tear the heart out of your job



Let us tell you how and why
Insley Manufacturing Company
800 N. Olney St. Indianapolis, Ind.

Highway Department Problems of Snow and Ice Removal

The necessity for prompt snow removal is taken for granted but the promptness depends on the importance of the road, said C. W. McClain, Engineer of Maintenance, Indiana State Highway Commission, in a paper before the Twenty-First Annual Purdue Road School, in discussing the new developments in the field of highway maintenance.

The newest equipment of the Indiana State Highway Commission consists of small straight blades attached to high-speed light trucks. This enables the men to make frequent trips which, in most cases, keeps ahead of the storm, unless it is especially severe. Supplementing this high speed removal equipment should be a few heavy-duty V-type plows for heavy drifts and very deep snows.

Ice is recognized as a very distinct hazard and should be removed as quickly as possible. Sand, stone grits, or cinders should be stored at strategic points on curves and grades and applied promptly when ice forms. Calcium or sodium chloride is recommended as an admixture to the stockpiles to prevent their freezing and to aid in embedding the grit particles into the icy surface.

High speed spreaders are recommended which will handle mixtures of grit and either calcium or sodium chloride. These can be used on greater lengths of road. After the chemicals have melted the ice sufficiently it can be removed with a grader, thus eliminating the hazard entirely. The greatest effectiveness gained from any method of ice control depends on promptness.

They Say "Okay"



FLEXIBLE ROAD JOINT MACHINE CO., WARREN, OHIO

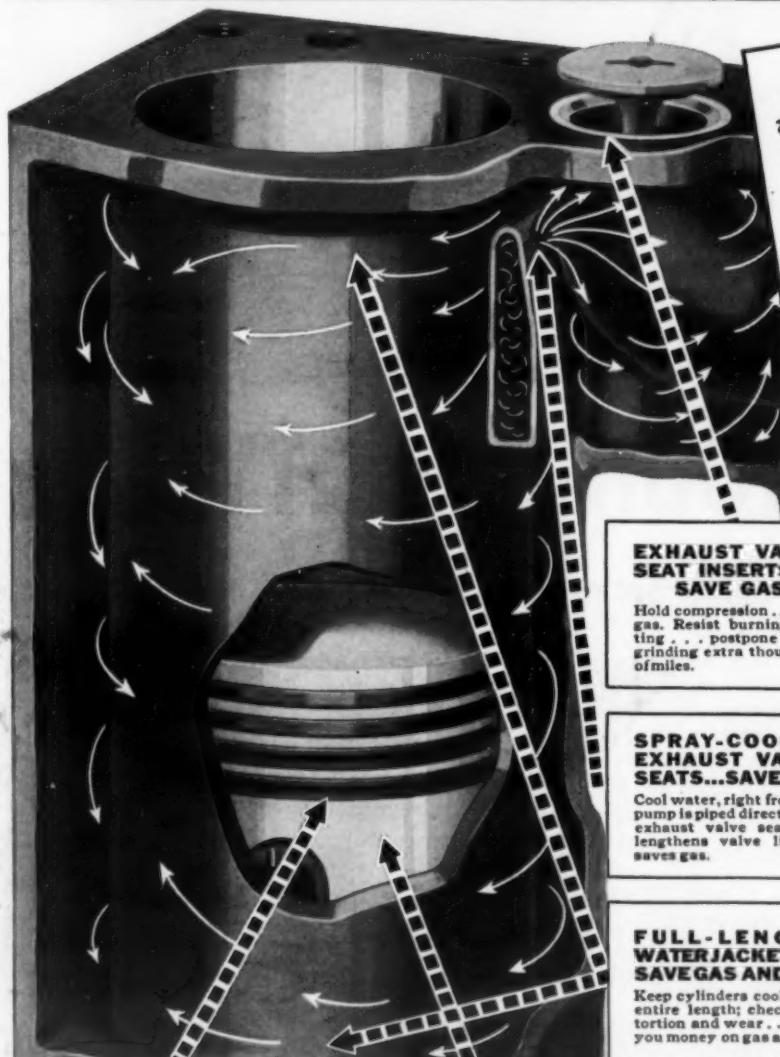
The wide FLEX-PLANE Screed produces the best riding surface.

The FLEX-PLANE Combined Dowel Rod and Expansion Joint Spotter speeds up the job, saves considerable money and does a better job.

The FLEX-PLANE Joint Installing Machines are too well known to comment here.

Ask for Bulletins—

Here's Why so Many 1935 DODGE TRUCK OWNERS Report Saving \$65 to \$95 on Gas Alone



I picked Dodge of the 3 lowest-priced trucks, because it has hydraulic brakes, full-floating rear axle, and all those amazing gas and oil saving features

J. L. SAMUELS
Chicago, Illinois



EXHAUST VALVE SEAT INSERTS... SAVE GAS

Hold compression... save gas. Resist burning, pitting... postpone valve grinding extra thousands of miles.

SPRAY-COOLED EXHAUST VALVE SEATS... SAVE GAS

Cool water, right from the pump is piped direct to the exhaust valve seats... lengthens valve life... saves gas.

FULL-LENGTH WATER JACKETS... SAVE GAS AND OIL

Keep cylinders cool their entire length; check distortion and wear... save you money on gas and oil.

4 PISTON RINGS... SAVE GAS AND OIL

Dodge gives you 4 piston rings where the other lowest-priced trucks give you only 3. Better compression... hold power... save money on gas and oil every day.

ALUMINUM ALLOY PISTONS... SAVE GAS

Lighter weight of this finer Dodge feature means quicker pick-up... reduced engine vibration... less strain on bearings. Saves real money on gas... prolongs engine life.

\$365*

*List price at factory, Detroit, without tax, change without notice. Special equipment, including dual wheels on 1 1/2-ton model, extra. Time payments to fit your budget. Ask for the official Chrysler Motor Commercial Credit Plan.

CHECK Dodge features and you will see for yourself why owners of Dodge trucks are reporting such astonishing savings. Users everywhere say that the saving on gas alone often runs from \$65 to \$95 per year. But that's only the start! There are many other ways in which Dodge trucks save you money. Genuine hydraulic brakes stay equalized, save you money on tires, brake relining and adjustments. Full-pressure lubrication saves wear, cuts repair costs. Oil filter saves you money on oil. Full-floating rear axle saves upkeep expense on Dodge trucks. A total of 18 such high-priced features save money for you every mile your truck is driven. And only Dodge gives you all of them, in the lowest-priced field. Before you buy any truck, see your Dodge dealer!

DODGE DIVISION—CHRYSLER MOTORS



1 1/2-TON CHASSIS AND CAB—\$595*
6-cyl., 137" w. b.—with 18 high-priced, quality features. (Dump body and special equipment extra)

Dependable DODGE TRUCKS

New Patch Roller Is Versatile Unit

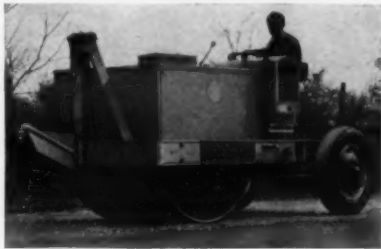
The new Galion portable patch roller, recently announced by the Galion Iron Works & Mfg. Co., Galion, Ohio, is a versatile unit suitable for use in rolling all kinds of patch material, for compacting loose material, rolling drives and similar work. Weighing 8,600 pounds, it is claimed to perform the same service as the conventional 5 or 7-ton tandem rollers.

In its design, full consideration has been given to the convenience of the operator. Steering is accomplished by means of a large automotive-type steering wheel. Forward and reverse motion is controlled by a single conveniently located lever. Gear shift and hand brake levers, motor throttle and control rod for sprinkler valve are all within easy reach of the operator.

The motor, transmission and com-

pression roll are mounted in a subframe hinged at the back to the main frame by a large cross shaft mounted in bronze bushings and supported at the front by a yoke which is attached to the hydraulic ram for raising and lowering the subframe.

The power plant consists of a high-efficiency 4-cylinder motor equipped with air cleaner, magneto with impulse starter, governor and fan. The transmission is fully enclosed and operates on friction reducing bearings in an oil



The Galion Portable Patch Roller

bath. Fuel consumption for normal conditions is one gallon per hour. A water tank and valve and sprinkler pipe are provided for keeping the surface of the compression roll wet when rolling sticky material.

Another feature of this unit is its portability. It can be attached to a truck quickly, the roll raised off the ground by means of the hydraulic lift, and can be transported from one place to another at truck speed.

New Sweeper-Blower for Surface Treatment

To meet the specifications of those state highway departments which now require that the road surface be cleaned by air as well as swept prior to the application of bituminous surface treatment and retread paving, the Frank G. Hough Co., 919 No. Michigan Ave., Chicago, Ill., has developed a new Universal sweeper-blower. This machine operates on the same principles as the



A Combination Sweeper-Blower

Universal road sweeper but is a combination machine which both sweeps and blows at the same operation.

Built on a heavy I-beam chassis and mounted on Timken-bearing pneumatic-tire wheels, the machine is operated by a 30-hp heavy-duty type Hercules engine equipped with an oil-type air cleaner and other accessories. The blower is a No. 8 Champion with the impeller mounted on a ball-bearing shaft, and driven direct from the engine. The nozzle is designed to deliver the largest volume of air at the best pressure efficiency, and is adjustable.

Shows are interesting BUT THE REAL SHOW IS "ON THE JOB"

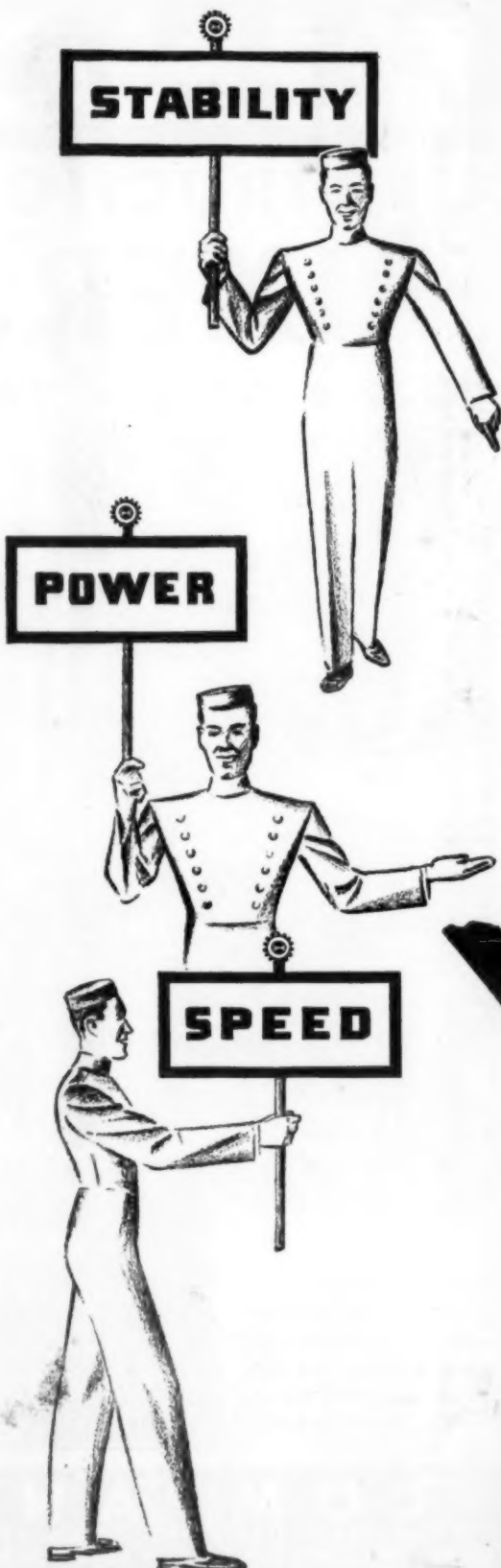
Winning grueling fights against bitter odds builds reputation. The Link-Belt, sound in every part from stem to stern, is a champion on the job. Capable looking on display—a mere indication of its worth in actual use. Only when you see it perform year after year can you fully appreciate its capacity for unexcelled service and compute its true value. From $\frac{3}{4}$ to 3 yds. capacity, heavy-duty built. Gas engine, Diesel, or electric motor drive. All models can be shipped loaded on a flat car without dismantling.

LINK-BELT COMPANY
300 W. Pershing Road, CHICAGO
Offices and Distributors in All Principal Cities



LINK-BELT

SHOVEL-CRANE-DRAGLINE





Vibrating Mass Concrete with a Jackson Concrete Vibrator

Internal Motor Vibrator Makes Stiff Mixes Denser

Concrete vibrators built for hard continuous service, with completely submersible waterproof motors encased in chrome nickel steel, are made by Electric Tamper & Equipment Co., Ludington, Mich., in four models. The VS-E1 has a 4-inch motor, 16 inches long; the VS-4 has a 6-inch motor, 18½ inches long; the VS-3 has a 6-inch motor, 12 inches long; and the VS-2 has the same size motor as the VS-3 but with a longer handle.

The Model VS-E1 4-inch Vibro-Spade is recommended by the manufacturer for use by contractors who wish to spade joints and other work of a general nature such as bridge construction, etc., as it is more generally suitable for all-round work. It can be fitted with a short rigid handle for use where the operator can work directly on the concrete or between the forms, or with a long 12-foot flexible hose handle for use where concrete is being placed in comparatively thin or deep sections.

New Automatic Control Regulates Compressor

A new development in air compressor construction has been announced by the Amplex Division of the Chrysler Corp., Detroit, Mich. This development consists of an entirely new device for the complete automatic variable speed control of Chrysler portable air compressors. The control is so designed that the speed of the engine and the air compressor is regulated automatically by the load or demand.

As air tools are added to or taken off the compressor line, the speed of the engine and compressor increases or diminishes as the case may be. Instead of the usual cut-out and cut-in control it permits the Chrysler machine to "float" on the line and regulates the production of air to the exact amount needed for a given operation.

USE RIGHT BUCKET FOR THE JOB



Hayward makes all four — clam shell, drag-line, electric motor, orange peel. A Hayward recommendation is unprejudiced.



THE HAYWARD CO., 32-36 Day St., New York
HAYWARD BUCKETS

This new device is interconnected with the Chrysler automatic unloading and maximum speed control. The use of the automatic control will result in lower operating and maintenance costs, as the engine and compressor do exactly the amount of work required of them and no more.

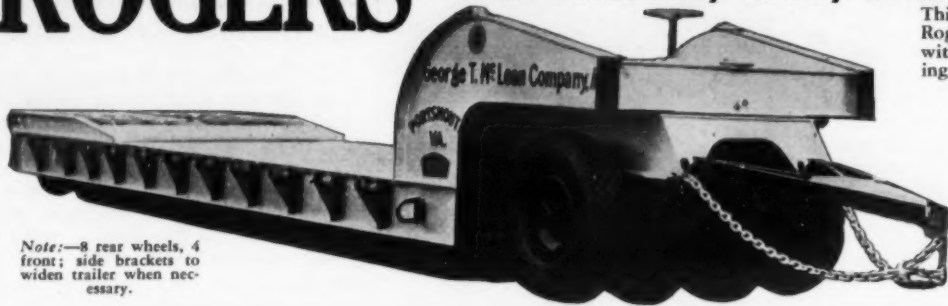
New Iowa Dealer Appointed by Bucyrus-Erie

The Haight Tractor & Equipment Co., 1214 Mulberry St., Des Moines, Iowa, has recently been appointed distributor for the Bucyrus-Erie Co. in the central

and eastern portions of Iowa. This company will handle Bucyrus-Erie shovels, draglines, cranes, clamshells, drag shovels and skimmer scoops, in sizes from ¾ to 2-yard capacities. A branch office of the Haight company is maintained at Clinton, Iowa.

ROGERS

GOOSE NECK HEAVY DUTY TRAILER for unusually heavy or bulky loads



Note:—8 rear wheels, 4 front; side brackets to widen trailer when necessary.

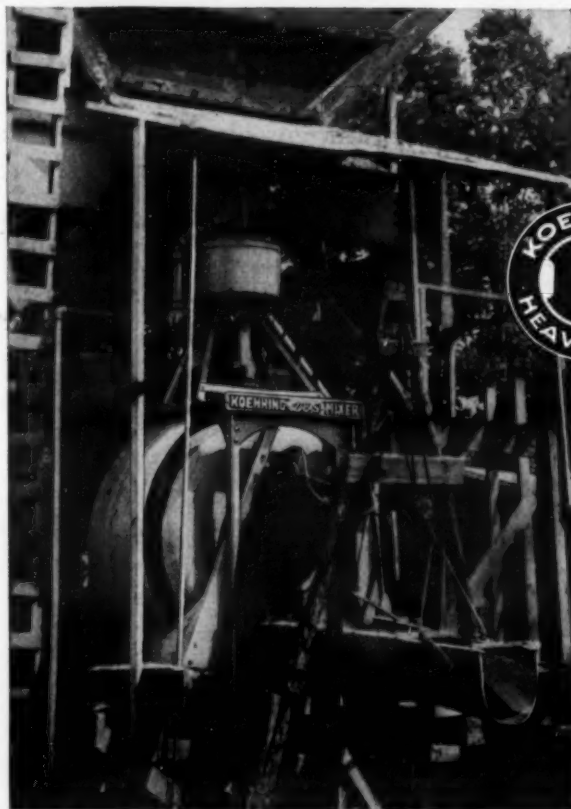
This is only one of the many Rogers models, every one with that famous low loading height and every one with more than ample strength for the job. Write for Catalog No. 28.

ROGERS BROS. CORPORATION
108 ORCHARD ST.
ALBION, PA.

KOEHRING

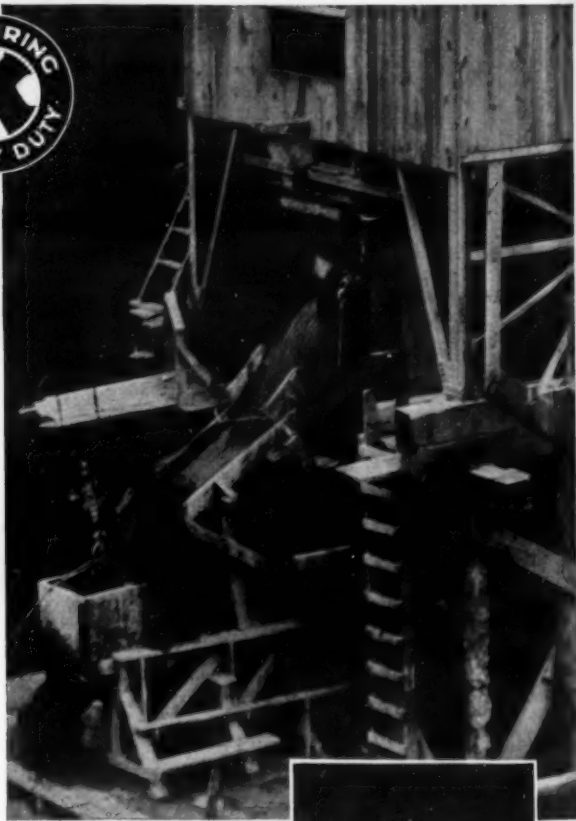
HEAVY DUTY CONSTRUCTION MIXERS

28-S • 56-S • 84-S



KOEHRING HEAVY DUTY Concrete Construction Mixers are used on a great variety of large volume concrete projects — locks, dams, bridges, power plants, sanitation and water works projects, etc.

Compact design permits minimum installation space. *High speed charging and discharging insures maximum production.* Heavy Duty Construction results in continuous operation.



The Koehring Flow-Line discharge greatly decreases discharge time — substantially reduces abrasive wear and permits an unbroken, natural discharge flow of concrete.



KOEHRING COMPANY
Pavers • Mixers • Shovels • Cranes • Draglines • Dumpers • Mud-Jacks
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

Giant Cableway Erected at Bonneville

On August 6, the Columbia Construction Co. was just completing the erection of the double cableway from Bradford Island across the main channel of the Columbia to the Washington shore for handling materials at Bonneville. None too soon, for on that date the pumps were started for de-watering the south cofferdam. It is expected that the excavation will be completed and concreting in the cofferdam will start about September 1. This will constitute the first section of the main spillway dam.

The one tail tower of the cableway is located on the Washington side, and the two traveling head towers, operating on tracks 880 feet long are on the island. The span of the 3-inch locked-steel cable is 2,025 feet. This unusual length made necessary head towers 225 feet in height to get the required elevation.

Erection of these towers was made possible by means of a Marion 490 electric crane. The same unit with a 4-yard concrete bucket poured the counterweights, which weigh 375 tons each.

The concrete aggregates storage plant and the mixing plant are located on the Washington side. The materials are secured from Avery, Wash., about 40 miles from the site and transported there by railroad.

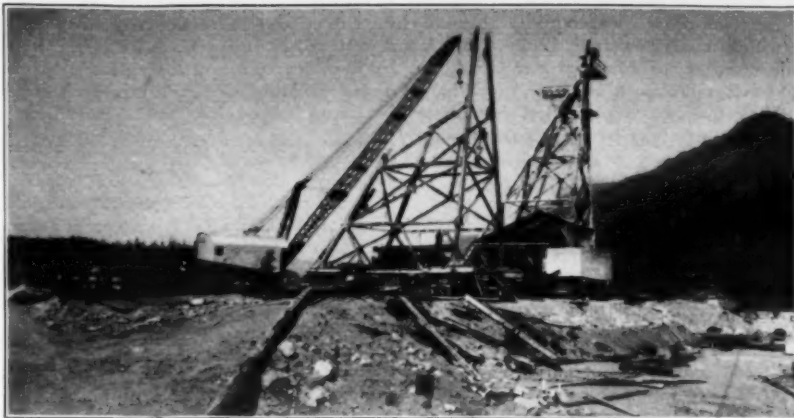
Consolidating Pavement with Vibrating Screeds

Vibration so rapid that it sets up a quaking or quivering action in the concrete has been used for several years in the construction of buildings and in the molding of cement products.

Vibration has also been used in striking off and consolidating concrete pavement where it has been found very effective. The vibratory impulses are given at the rate of about 3,500 per minute. Mixes of $\frac{1}{2}$ to $\frac{3}{4}$ -inch slump, too dry to be struck off or compacted by the ordinary finishing machine, are readily handled when vibration is applied to them. Using the same cement factor, a water-cement ratio of about one gallon per sack less is possible, with a corresponding increase in strength of about 1,500 pounds per square inch in compression at 28 days. If the strength is kept the same, about one less sack of cement is required per cubic yard of concrete. In other words, a leaner mix can be used in vibrated concrete without reducing the strength. Such a mix, when vibrated, produces concrete that expands and contracts less than the more common paving concrete—a further advantage for pavement.

The most common type of vibratory equipment is operated electrically. Three vibrators are attached to the front screed of an ordinary finishing machine and two to the rear screed. The vibrators are only operated during the first passage of the finishing machine.

Pneumatic vibrators are also on the market and have been used considerably for concrete pavements. The vibrators are either attached to the screeds of the



Putting the Last Members in Place for the Aerial Cableway Head Towers at Bonneville

finishing machine, as already described, or may be used with a hand-operated template. A compressor outfit is required with the pneumatic vibrator.

In spite of the excellent results secured so far, the vibration of pavement must be considered still in the experi-

mental state. It is entirely possible that vibration by means of a template resting on the surface is not the best method. Perhaps the vibratory impulses should be transmitted to the body of the concrete or even to the bottom instead of to the surface or possibly vibration on

a vertical face will prove superior.

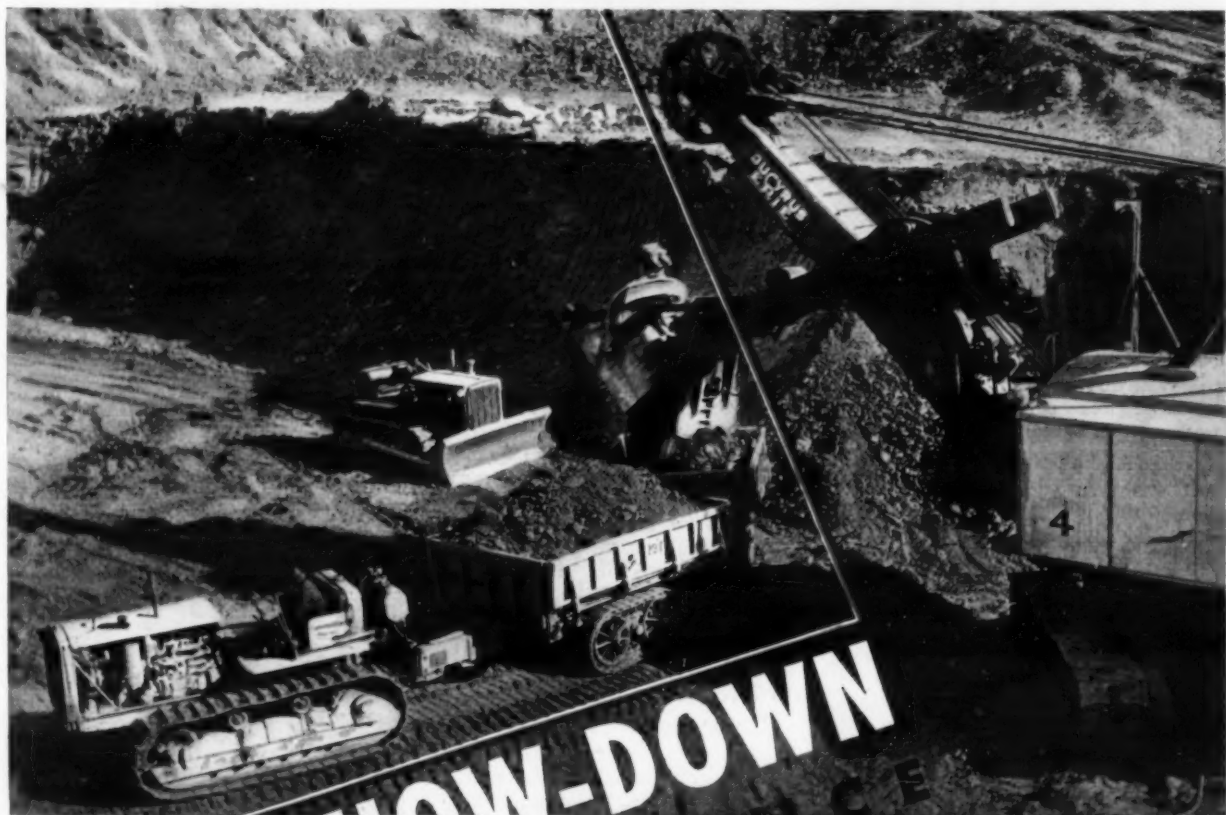
During 1934 one state required vibration on all of its concrete pavement construction. Previously experimental work had been done in several states with results that pointed to the entire practicability and great value of this method of finishing. It seems probable that vibration will become a standard method of building pavements in the near future. —E. M. Fleming, Portland Cement Association

TENTS
TARPAULINS
WINDBREAKS

The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaullins, Tents, Windbreaks. Write our nearest plant today for catalog, samples and price list.

Fulton Bag & Cotton Mills

Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS BIRMINGHAM NEW ORLEANS KANSAS CITY



THE SHOW-DOWN ON PREFERENCE

On 9 of the biggest construction jobs in the United States,* 92% of the tractors in use are "Caterpillar" Tractors. Depending on profits on uninterrupted performance at rock-bottom cost, contractors make "Caterpillar" their 9 to 1 choice. Their preference is a Show-Down for every power user. Caterpillar Tractor Co., Peoria, Ill., U. S. A.

*A recent census on these jobs showed over 350 "Caterpillar" Tractors at work—more than half of them Diesel models:

- Grand Coulee Dam
- Sutherland Reservoir
- All-American Canal
- Metropolitan Water District
- Fort Peck Dam
- Muskogum Valley Flood Project
- Grafton & Kanawha Dam
- Sky-Line Boulevard
- Bonneville Dam

CATERPILLAR

D I E S E L

At Grand Coulee Dam (see photograph above), as on every other big construction job, "Caterpillar" Diesel Tractors stand far in the lead—in numbers, and in performance.

REG. U. S. PAT. OFF.

Clamps

For multi-purpose clamps that meet the requirements of all jobs, that have a "hundred uses" . . . Pony Fittings—go on ordinary $\frac{1}{2}$ " pipe, make clamps of any length. Instantly adjustable. Powerful. Strong. Patented stop clips to position, grips at any point. Crank screw for tightening. Take place of helper on many jobs. Always in use.

Check

these uses:
Making sectional forms
Assembling forms in place
Holding forms while pouring
pillars, etc.
Holding forms for posts and rails, Pulling in holes, etc.

Write for full information
Adjustable Clamp Co.
"The Clamp Folks"
427 N. Ashland Ave., Chicago, U.S.A.

Mich. Road Stabilized with Common Salt

(Continued from page 1)

ing the dry weather the traffic punched holes through the gravel, making it very difficult to maintain a smooth riding surface. It was divided into six sections of about 750 feet each and markers were planted at the fence line opposite the division points of the sections. Each face of the marker carried the section number and the rate of application of sodium chloride or calcium chloride used in the respective sections.

The depth of gravel on this road averaged 5 inches. It was scarified to a depth of 3½ inches after which the oversize stone was removed with a York rake and hauled away in trucks. The loose gravel was then analyzed in the usual manner. A deposit of clay, having a plastic index of 20, was located about 2½ miles from the project. Tests were run to determine the proper amount of clay to be added which resulted in the use of 288 cubic yards on the entire job.

The loose gravel was windrowed and the clay placed on the shoulder to be dried out after which it was pulverized and mixed with the loose gravel. The mixture was then spread over the road and the top 1½ inches bladed off and placed in a windrow on the shoulder. The remaining material was wetted down and allowed to compact for three days at which time it was quite firm. The loose gravel on the shoulder was then spread over the road.

Up to this point the operations had been identically the same for all sections, having been performed as though it were all one section.

Adding the Salt

Salt was then added. On the first section, which was the north end, salt was applied at the rate of 16 tons per mile. The second section received 12 tons per mile, the third 8 tons per mile, the fourth section 4 tons per mile, the fifth section received 8 tons of salt and 2 tons of chloride and the sixth section received 2½ tons of chloride per mile, which is the rate of application which is normally used on our chloride stabilization work.

After the application of the salt the material was thoroughly soaked and mixed and when it had dried out sufficiently it was shaped and allowed to compact by the aid of the traffic.

Costs and Results

The cost of this project was rather high because the section was so short and because the clay was excavated and loaded by hand. The cost distribution follows:

Scarifying, raking and blading.....	\$245.28
Placing clay.....	235.59
Applying and mixing salt.....	63.09
Shaping after addition of salt.....	88.86
Calcium chloride application.....	4.00
Total	\$636.82

This work was completed during the latter part of September 1933 and early in 1934 an application of salt dissolved in water was made together with a film of birdseye size gravel for wearing surface.

The section on which 8 tons per mile

of salt was placed was equally as good as where more was used. Four tons per mile was not sufficient for good results. The salt sections became harder than the calcium chloride section but they became dusty sooner than where the chloride was used. The stabilization has prevented breakup in dry weather.

New Shovel Bucket of Aluminum and Steel

By careful design and the use of aluminum alloy and high-tensile rolled steel for parts not subjected to the heaviest abrasion, the American Manganese Steel Co., Chicago Heights, Ill., is producing a composite-type power-shovel dipper of unusually light weight. It is reported that this new type dipper in the larger sizes can weigh less than half of the solid all-cast type, thus allowing a great increase in shovel capacity without a corresponding increase in power used. A 15-cubic yard Amsco composite dipper for use on a Marion 5320 shovel weighs 32,940 pounds as compared with 74,000 pounds, the weight of a 15-yard all-manganese steel dipper made several years ago.

The composite dippers have a top casting of manganese steel, complete double wall construction, with integral bases and bail connections. The bottom casting, likewise of manganese steel, is also double walled at the back where the dipper stick is connected. The front plates are high-tensile rolled steel welded with spacers to form a double wall between top and bottom castings. The back plate is of rolled aluminum alloy while the back braces connecting the top and bottom castings are cast aluminum alloy.

The manufacturer does not pretend that these composite dippers will stand the same abuse that an all-manganese steel dipper of the same capacity can undergo, but for medium work where a plate or cast-steel dipper affords sufficient structural strength, the Amsco composite dipper will show greater economy by reason of the impact and wear resistance of the exposed manganese steel parts.

New Alabama Dealer for Chain Belt

The Burford-Toothaker Tractor Co. of Montgomery, Ala., has recently been



An Advanced Design . . .

"Conweigh" originated the first anti-friction troughers and today "Conweigh" presents an advanced design which provides the ultimate in economy, performance and service. The new "Conweigh" catalog describes our line of troughing and return idlers, trippers and accessories. They will measure up to the most rigid requirements of the largest as well as the smallest job. We will gladly prepare layouts, sketches, blue prints and quotations upon request.

Our line of portable and semi-portable conveying equipment is described in our catalog of "Porta Conveyors."



PORTABLE MACHINERY CO.

Division of A. B. PARQUHAR CO., Limited
Box C-1, York, Pa.

appointed exclusive distributor of Rex construction equipment in that territory. The company maintains a warehouse in Montgomery and will handle

Rex pavers, mixers, pumps, plaster and mortar mixers, cold patch mixers, central mixing plants and Pumpcrete, all made by the Chain Belt Co.

Announcing

LANSING

K-4 CONCRETE CART

Pneumatic-Tired Wheels and
Timken Roller Bearings



For contractors, builders and concrete workers. Capacity 6 cu. ft., dry material. Fitted with round bottom bowl, dumps easily. Equipped with pneumatic-rubber tires and Timken roller bearings. Size of bowl 23¼" over all, 39¼" long at top, 19½" deep, weight about 190 lbs.

Ask for
Latest
Literature
and
Complete
Details

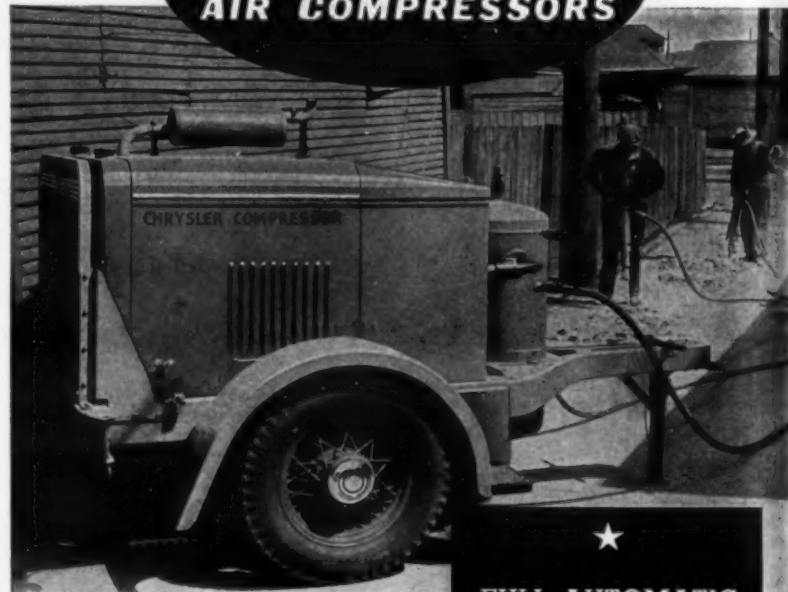
LANSING COMPANY

LANSING, MICHIGAN

CHICAGO KANSAS CITY MINNEAPOLIS SAN FRANCISCO
NEW YORK BOSTON PHILADELPHIA

Chrysler

AIR COMPRESSORS



★
LOW IN COST
inexpensive to buy
and operate

★
FULL AUTOMATIC
CONTROL
an exclusive Chrysler
economy feature

★
MOBILE
easy to get to the job

Completely automatic—like having an extra man at the controls . . . the ability to "take it" under all conditions . . . the ability to "give it" in much better than average doses . . . these are but a few of the factors that are making Chrysler Compressors popular with men who want things done, and done right.

Thousands of hours of operation in all kinds of work prove conclusively that Chrysler Compressors do what they are supposed to do . . . at less cost. Write today for the new completely illustrated catalog.

CHRYSLER CORPORATION . . . AMPLEX DIVISION
DETROIT, MICHIGAN

Dependable 2" to 8" Self-Priming PUMPS

The choice of
contractors
from
coast to coast

Write for copy of our combined catalog
and valuable bulletin of engineering data
—sent FREE on request.

Sterling Machinery Corp.
411-15 Southwest Blvd., Kansas City, Mo.



The Aggregate Plant at Grand Coulee, Showing the Screen House in Foreground. The Pendulum Boom 800 Feet Above is Fed by a Jeffrey-Traylor Electric Vibrating Feeder, Capacity 1,250 Tons Hourly.

Largest Aggregate Plant for Grand Coulee

The attention of the Mason-Walsh-Atkinson-Kier Co., contractor for the Grand Coulee Dam on the Columbia River in Washington, is now centering on the completion of the aggregate plant which promises to be the world's largest and most modern sand and gravel plant, with a feedput of 2,500 tons an hour and an output of 1,000 tons an hour of thoroughly processed aggregate material. The balance, 1,500 tons, will be wasted as material un-

suited for use.

All the processes from mining pit to aggregate plant to mix stations are tied together by belt conveyor units on centers, totaling 21,300 linear feet, more than 4 miles of conveyors. These conveyors were furnished by the Jeffrey Manufacturing Co., whose engineers also designed the plant in consultation with H. L. Meyer, Job Manager, and C. D. Riddle, Job Engineer for M-W-A-K Co.

For the completion to its full proposed height of about 450 feet and length of over 4,300 feet, Grand Coulee Dam will require some 11,000,000 cubic yards of concrete, it is estimated.



The Kalguard Bracket—A Feature of the New Kalguard Guard Rail

New Highway Guard Rail for Traffic Protection

Kalguard, a modern, economical highway guard rail which meets all state specifications, has just been developed and placed on the market by the Kalman Steel Corp., subsidiary of Bethlehem Steel Corp., Bethlehem, Pa. This guard rail consists of strips of semi-spring steel joined together to form a continuous rail which is attached to the posts by means of shock-absorbing brackets and held in proper alignment through helical-spring assemblies at the end posts.

It is made in standard assemblies, end, bracket and intermediate sections, to facilitate ordering and installation. The intermediate sections of the rail are furnished in standard widths of 12 inches and standard lengths of 16 feet, in any gage specified, but to meet unusual conditions, other sizes may be readily obtained. For installation on existing bridges, Kalguard is furnished in 18-inch widths.

The standard end sections, containing the helical springs in a neat housing, come in pairs; one section being 10 feet in length and the other 6 feet, so that the overlap will always be 2 feet from the post brackets. The Kalguard post bracket features a combined spring-leaf and semi-circular shock-

Loading 5-Yard Trucks With a 12-Yard Scraper

A rather unusual application of a 12-yard scraper was made by the West Construction Co. of Kellyton, Ala. A 12-yard LeTourneau Carryall scraper pulled by a Caterpillar Seventy-Five diesel tractor dumped its load through an opening in a platform over a depressed roadway through which Autocar trucks drove to receive their loads.

On a 36-hour check up of dirt moved with the trucks hauling quite a distance so that the scraper had to stand still for a considerable part of the time, in the first 12 hours of operation 850 yards of loose material was moved, 950 in the second 12 hours and 1,000 yards the third 12 hours. The maximum haul for the scraper was 750 feet one way.

One morning when all the trucks were in operation, and the Carryall worked on a short haul, ten 5-yard trucks were loaded in 21 minutes with about 5½ yards of loose material to the truck.

absorbing element made of spring steel. The semi-circular section is located directly in front of the post, while the spring-leaf sections extend 12 inches beyond the center of the post. It is designed to sustain the rail plate against heavy impact without affecting its essential resiliency.

No special tools are required to erect Kalguard. The brackets are first hung on the posts; one 16-foot intermediate rail section is then inserted through the four clips on each post bracket; and the intermediate plates loosely bolted together to allow the plate to move freely until the entire rail is assembled. The end sections are then attached to the end posts with 1-inch bolts, 48 inches long, allowing an adjustment of 24 inches which enables the entire length of guard rail to be held in proper alignment under impact and temperature changes. The nuts of the take-up bolts are housed in a channel which prevents their turning while being tightened.

This is the unit that ETNYRE built

to improve an already remarkable line of bituminous distributors

1. *A more compact assembly* of pump, valves and circulating system reduces the weight about 300 pounds, permits the unit to be mounted 4 inches lower on the truck without reducing the road clearance of the spray bars, makes insulation easier, and allows the valves to be readily heated from the motor exhaust.
2. *The new leakless valves* eliminate the drip-drip which has up till now been so annoying to operators.
3. *The new fifth-wheel-driven tachometer* is proving more accurate and satisfactory than either front-wheel or transmission drive. The fifth wheel is raised, when the truck is on the way to or from a job.

504—Write just this number—504, on a post-card, with your name and address, and we shall be glad to send you a copy of our Bulletin No. 504 which will give you further interesting facts concerning this new ETNYRE.



E. D. ETNYRE & CO.

DEALERS IN ALL PRINCIPAL CITIES

400 JEFFERSON ST.,

OREGON, ILL.



MODEL FO2

La. "Bottomless Hole" Problem Solved

(Continued from page 5)

broken off, probably by the 1885 flood.

The North Approach Fill

In this description the major portion will be devoted to the north approach fill with only notes on the variations of method and equipment at the south end. When clearing was under way and during the first lift of the fill at the north end the ground was so wet because of the rains that all laborers had to wear hip boots. Frequently the timekeeper in making his rounds would be stuck in the mud near the draglines that were spreading the material on the fill and would have to be pulled out with the bucket.

Loading at the Borrow Pits

At the north end a Koehring dragline with a 40-foot boom and a 2-yard Bucyrus-Erie bucket loaded the trains which ran around a loop of track to save a passing switch. As the train pulled in near the borrow pit a crew of three men put bagasse on the bed of each car to prevent the wet material sticking to the cars. Two of the men shoveled in the shredded cane fiber and the third spread it over the entire bottom of the car. This gave fast and clean dumping on the fill. At the south end the trains were loaded with a Bucyrus-Monighan with a 75-foot boom and a 3½-yard Bucyrus-Erie dragline bucket.

Hauling by Industrial Railroad

The hauling from the borrow pit was done by 7 and 10-car trains of Western 4-yard dump cars pulled by industrial locomotives. There were two 12-ton Plymouth locomotives and one 8-ton Plymouth. At the loading end a spotter aided the locomotive engineer in placing the cars under the dragline with speed. With an average 4,000-foot haul, this equipment delivered between 500 and 550 cars a day to the fill. The best day was 620 cars with full loads.

The contractor was experimenting with a new type of carburetor developed locally which permitted the standard gas engines of the locomotives to use a relatively low grade of fuel oil. There seemed to be a little difference of opinion as to the savings effected and the locomotives at the south approach were not equipped with the new devices.

Dumping and Spreading the Fill

The specifications required that the fill be built up in 18-inch lifts. The crown of the fill was 52 feet on which a 41-foot roadway was laid later. When

dumping the cars at the water hole it was necessary to provide a platform for the dumping crew. This was built of 4x4-inch stringers run through under the rails to form a cantilever on either side and was planked over with four 2x12's. There were seven men per shift in the dumping crew, including a spotter.

As the crown widened at the water hole two spur tracks were laid so that the train could dump out to the edge of the fill. The material was then spread with a wing spreader pushed along the tracks by one of the locomotives.

To spread the material at all other sections except the water hole two draglines were used at each approach. At the north end a Northwest dragline and a P & H 700 were used while at the south end a Bucyrus-Erie and another P & H 700 were used. These machines mucked out the material as dumped from the cars and spread it as accurately as possible in 18-inch lifts. As it dried it was spread evenly by a Cater-

(Continued on page 23)



MARTINDALE SAFETY SIGNALS

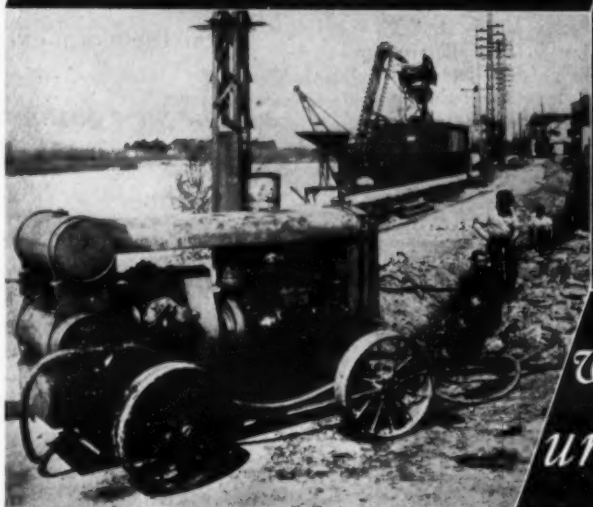
Their effectiveness reduces accidents

Write for new bulletin

MARTINDALE ELECTRIC CO.

1387 Hird Ave., Cleveland, Ohio

10 months of 24-hr. operation



Lyons, France—XAHU 25 hp. Waukesha-Hesselman Engine driving Ingersoll-Rand Portable Compressor which furnishes air for the Jackhammers. Cobet, Freres, Contractors.

with engine up-keep under 5 mills per hr.

● On the new sky way road job in Shenandoah

National Park near Fort Royal, Va., five Ingersoll-Rand Portable Compressors like this, driven

by 100 hp. WFH Waukesha-Hesselman Oil Engines, operated 24 hours a day for ten months

furnishing air for operation of wagon drills. A total of 29,000 consecutive machine hours! Yet

the bill for overhaul, maintenance and repair amounted to only \$210.50, including the compressor

itself. Assuming that the engine maintenance was more than half the total, for this strenuous

schedule, the cost is still under 5 mills per hour. ● For more than three years Ingersoll-Rand have

been shipping these engines with their portable compressors to all parts of the world. And nowhere

has it been found necessary to use experienced labor to operate them. A Hesselman is so simple in

construction that anyone understanding gasoline engines can operate it. ● Write for Bulletin 1,000.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

WAUKESHA ENGINES

MORE YARDAGE per day



because of power and less cable overhaul.

Give the Williams "Champion" the job of boosting your profit-hook 'er to your crane now.

The Williams "Champion"

Williams digging demons also include Multiple-Rope and Dragline Buckets. Write for bulletin.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS BUCKETS

American Equipment in the Garden of Eden

(Photo on page 40)

That the Garden of Eden may again flower forth with the verdure, and fruit trees, which made it such a Paradise for Adam and Eve is apparently the plan of the Iraq Government project designed to bring irrigation water to what is said to be the site of the original Garden. The Kut Barrage, as the project is called, involves the excavation of 1,250,000 cubic meters (1,634,000 cubic yards to you) of material, most of which is fine alluvial silt.

Balfour Beatty, contractor for the job, is using at one point in the work five LeTourneau 8-yard Carryall scrapers, a LeTourneau bulldozer and several 50-hp Caterpillar tractors. On a 600-foot round trip haul, an experienced American operator who went there to break in the equipment, averaged 64 cubic meters (83½ cubic yards) hourly. Native operators, without any previous experience with this equipment, soon got the swing of it, and within a couple of days were turning out an average of 57 cubic meters hourly in an 8-hour day.

A short way down stream from this mechanical equipment, excavation is going on by hand labor. The natives do all their digging by hand, loading into sacks which are carried to the fill. The haul for this hand labor is also 600 feet for the round trip and the average daily output is 2.52 cubic meters per man.

A. I. S. C. Reopens Three District Offices

In anticipation of improved business and a greater inquiry on the part of private buyers of fabricated structural steel, three district offices have been reopened by the American Institute of Steel Construction. At the same time a realignment of territories was made.

The new district offices are located at Room 405, Bona-Allen Bldg., Atlanta, Ga., with C. R. Bloxton in charge; Paul Brown Bldg., St. Louis, Mo., with Robert J. Wood in charge; and 3461 Purdue St., Dallas, Texas, in charge of L. H. Dodd.

The Atlanta office covers the territory of Virginia, eastern Kentucky, North

Carolina, South Carolina, Tennessee, Georgia, Alabama, Mississippi, Florida and New Orleans, La. Southwestern Indiana, southern Illinois, eastern Missouri, western Kentucky, Arkansas, and Louisiana, except New Orleans, are included in the territory covered by the St. Louis office; and the Dallas office covers Texas and New Mexico.

Catalog Answers Questions and Tells Prices

The Gear Grinding Machine Co., Conant Road & G.T.R.R., Detroit, Mich., has recently issued a new Federal-Grico catalog with a novel price list feature. The intent of this catalog and associated price list is to provide answers to the questions asked so frequently by prospective customers without the necessity of contacting the truck manufacturer or the accessory manufacturer. These questions are: 1. How does the job work? 2. What load will it carry? 3. What speed will

it make? and 4. Specific costs. The price list FE1 when superimposed on Table 2, which contains the major specifications of Grico 2-axle drive, gives the

Grico prices for the different wheel-bases directly. Copies of this catalog and prices may be secured from the Gear Grinding Machine Co.

JAEGER "SURE PRIME" PUMPS

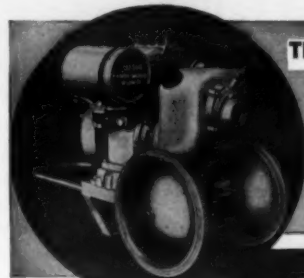
(10,000 to 135,000 GALLONS)



Left: "BANTAM WEIGH," 8500 Gal. Portable Pump

Built in 2", 3", 4", 6" and 8" sizes, Jaeger Heavy Duty Self-Priming Centrifugals are world's largest selling pumps of their type for construction jobs, industrial work, public utility and municipal maintenance, etc. JAEGER WELL POINT SYSTEMS provide "dry job" conditions at lowest known cost. Used on small jobs and biggest. Send for new CATALOG P-35.

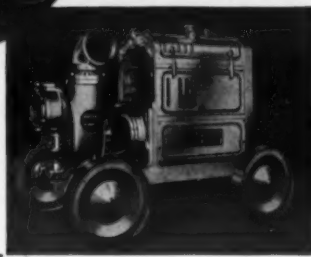
THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio



The "Handy Model"

LOWEST PRICED

8500 Gallon Pump Built



**Announcing
the new 85-B
2½-yard
convertible
excavator...**

NEW fast operating speeds, new quick convertibility with high efficiency as either shovel or dragline, new ease of operation, new ease of shipment . . . these are but a few of the money-making features which bring about the sustained high output of this startling machine. Identical in design to the famous 120-B convertible shovel and dragline, that has made such a name for itself in mine, quarry and heavy construction work, this new 2½-yard machine warrants your careful investigation. Write for the 85-B bulletin.



**JACKSON
CONCRETE VIBRATORS**

FURNISHED in various sizes, external and internal, for jobs of all types and sizes. JACKSON CONCRETE VIBRATORS are sturdier . . . easier to handle . . . more dependable . . . more economical to operate and maintain . . . place denser, stronger concrete with marked savings in cement and labor. Furnished with portable power plants if desired. Write for information. ELECTRIC TAMPER & EQUIPMENT CO., LUDINGTON, MICHIGAN.



BUCYRUS-ERIE
EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

Outfall Sewer Pipe Goes to Sea

Welded Pipe on N. J. Job Pushed 1/4-Mile Into Water In Ingenious Manner

FREQUENTLY contractors are faced with the problem of the construction of a pipe line that has to pass through or extend into the water. Thomas Proctor, Inc., of Long Beach, N. J., was faced with such a problem on the Asbury Park, N. J., outfall sewer project which was recently completed.

The job consisted of laying a 24-inch diameter sewer outlet into the ocean from a town which is directly on the shore, with no protection from breakwaters or harbor. The shore is entirely sand, as is also the ocean bottom at this point. The line projects out to sea between 1,000 and 1,200 feet.

Wrought iron pipe, 1/2-inch wall thickness and of 24-inch diameter, was used, purchased in 20-foot mill lengths which had been triple-lengthened at the mill into 60-foot sections, with the section ends beveled for ox-welding. In addition to being triple-lengthened, to add weight to the line and corrosion resistance to the circumferential joints, the two joints in each section were fitted with a 2-foot 6-inch sleeve of 1/2-inch thick wrought iron, applied by first grinding off the weld reinforcements and the split sleeve slipped in place. The longitudinal seam, and next the two girth or circumferential seams for each sleeve were then welded.

Joining the Pipe Sections

Ways were built back from the water's edge, extending in the exact direction that was intended for the finished line. Facing the ocean, on the right-hand side of the ways, slanting skids were built.

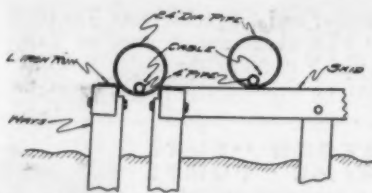
Then a donkey engine was set up on shore just to one side of the inland end of the ways. From the engine a cable passed through an anchored cable sheave, and then back to the pipe. By taking in cable with the engine, the pipe could be hauled seaward.

The front end of the first section of pipe to go out was blanked off with a bolted flat head, which was later removed by a diver. Three 60-foot sections were lined up on the skids and welded together to make one 180-foot section, which was then rolled into the ways, and backed out to sea, so that the inland end rested just over the bell-hole at the water's edge, where the tie-in welders worked. Then the next 180-foot section, made up similarly, was rolled into the ways, lined up with the first, tack-welded, welded together and the sleeve welded in place.

In this manner, all of the 60-foot sections were joined together, rolled onto the ways and added to the sea-going line. All of the work was done with High Test steel welding rod.

Applying Sleeves

When each joint was completed, a heavy anchor and reinforcement split sleeve was placed over the joint. Unlike the sleeves for the mill-made joints, this sleeve was formed to fit over the reinforcement of the weld. It was first slipped over the weld, and then clamped to draw the split edges together. By tightening the clamp the sleeve was forced into exact position and the longitudinal seam was ox-welded. Following this the two girth seams at either end of the sleeve were welded to the main pipe with a fillet-type weld. In order to facilitate welding, the circumferential seams were rotated to a certain extent, an available crane being used to give the pipe a half turn.



The General Arrangement of Skids and Ways for Handling the Pipe

Ballast

Another interesting feature of this project was the use of 4-inch diameter pipe placed within the larger pipe for ballast. Inasmuch as this smaller pipe

was not to be permanent, it was simply put together with screw collars. Then as the main line was joined and pushed out into the sea, water was pumped through the 4-inch pipe and into the main line.

When the line was completed, a cable which had been attached to the outer end of the 4-inch pipe was used to pull the pipe out of the 24-inch line. The cable hook-up was necessary inasmuch as the simple screw fittings would have been insufficient to pull out the line.

The illustrations and material for this article were furnished through the courtesy of Oxy-Acetylene Tips.

Meddick Appointed to Staff of C. O. Bartlett & Snow

The C. O. Bartlett & Snow Co., of Cleveland, Ohio, manufacturer of material handling and processing equipment, has announced the appointment of W. A. Meddick to a position on the sales staff. Mr. Meddick, who was formerly Manager of the Industrial Department for the Lakewood Engineering Co., and more recently was District Representative for a group of selected manufacturers, will have charge of sales of mixers, air filters and accessory lines.

FEWER

GAS ENGINE SIMPLICITY... DIESEL ECONOMY

On the All American canal this "WK-O", on the job every minute, operates at a fuel cost of only 15c per hour. Despite the dirt, sand, and dust, repairs are negligible—the oil engine operates smoothly and economically under all conditions, due to its simplicity of construction and low compression pressures.

ALLIS-CHALMERO

TRACTOR DIVISION—MILWAUKEE, U. S. A.

Line of Asphalt Kettles for Road Maintenance

Rosco asphalt kettles for highway maintenance, in a number of models, which are made by the Rosco Manufacturing Co., 3128-38 Snelling Ave., Minneapolis, Minn., are designed for heating all types of bituminous materials used on road or street maintenance, and construction work where light or heavy asphalts are used for joint and crack filling.

The melting kettle is made of heavy steel all electrically welded, equipped

with the necessary baffles to prevent slopping when moving. The cover is built tight to prevent spilling and fire hazard. The fuel tank is of an approved tested type equipped with hand air pump, pressure gage, air relief valve, and connections, resting on angle supports providing complete ventilation. The fuel tank is protected from the burner flame by a steel shield welded to the chassis frame. Material cannot flow to the burners. The burners are of the torch type of ample size for quick heating.

These kettles come in various models, ranging in capacity from 75 to 300 gal-



A Model K-E Heavy-Duty Service Kettle of 300-Gallon Capacity

lons. All are easily portable, and may be equipped with steel, pneumatic or solid rubber tires.

Kansas Contractor Worked Two Cuts and Fills at Once

Effective Use of Shovels and Elevating Graders on NRS 510 A, B and C

WITH three successive heavy cuts, of 90,000, 70,000 and 60,000 cubic yards, there was very good shovel working for List & Clark Construction Co. on their NRS Project 510 A, B and C, near Atwood, Kans. Two balances were worked at the same time, making it possible to haul both ways. The job was started with a new Northwest shovel loading to eight 5-yard trucks and an elevating grader with eight Thirty-Five tractors pulling pneumatic-tired wagons. These outfits together moved about 5,000 yards daily, in two 5-hour shifts.

The shovel outfit was used in cuts, rock, channels, and special ditches where the elevating grader could not be operated. The elevating grader handled the lighter work and what little casting there was on the job. At first an Adams 48-inch grader pulled by an Allis-Chalmers Model L tractor was used and later a Caterpillar 48-inch elevating grader pulled by a Caterpillar Seventy tractor, loading to eight Ford V-8 trucks.

Servicing Equipment

All servicing of equipment, except refueling with gas, was done at night. The contractor had a truck equipped with an air compressor, electric light plant and greasing equipment. When the afternoon crew went off, this truck was taken to the job and all equipment completely serviced. A portable electric welding outfit was also ready to be rushed to the scene of a breakdown at any time.

Culvert Construction

Since all of the concrete culverts had to be completed before much dirt could be moved, it was necessary for the concrete crew to work fast to keep out of the way. Two 10S mixers were used. On large pours they worked together while on the smaller culverts each mixer was used on a separate culvert, making it possible to pour two at once. Locally produced sand and gravel were used throughout the work.

Part of the culverts were built during the winter months of 1934-35 so that it was necessary to take precautions against low temperatures. The water and aggregate were heated before mixing and an oil torch in the mixer maintained the heat of the batch at 60 degrees. The concrete in the forms was kept at 40 degrees for seven days, by means of torches and heaters.

Personnel

E. E. Clarkson was Superintendent for List & Clark Construction Co. of Kansas City, Mo., and W. D. Scully was Resident Engineer for the Kansas State Highway Commission. The labor classifications on the work were the standard NRH groupings of skilled, intermediate skilled and common labor with wage scales of 85, 65 and 45 cents per hour respectively.

Tractor Attachments Taken Over by Emsco

The Emsco Derrick & Equipment Co., of Los Angeles, Calif., has purchased the entire assets of the Mack Wooldridge Co., and will manufacture and sell the complete line of Wooldridge tractor attachments, including the Wooldridge Trailbuilder.

Plans are being made for the improvement of the entire line and the addition of other equipment.

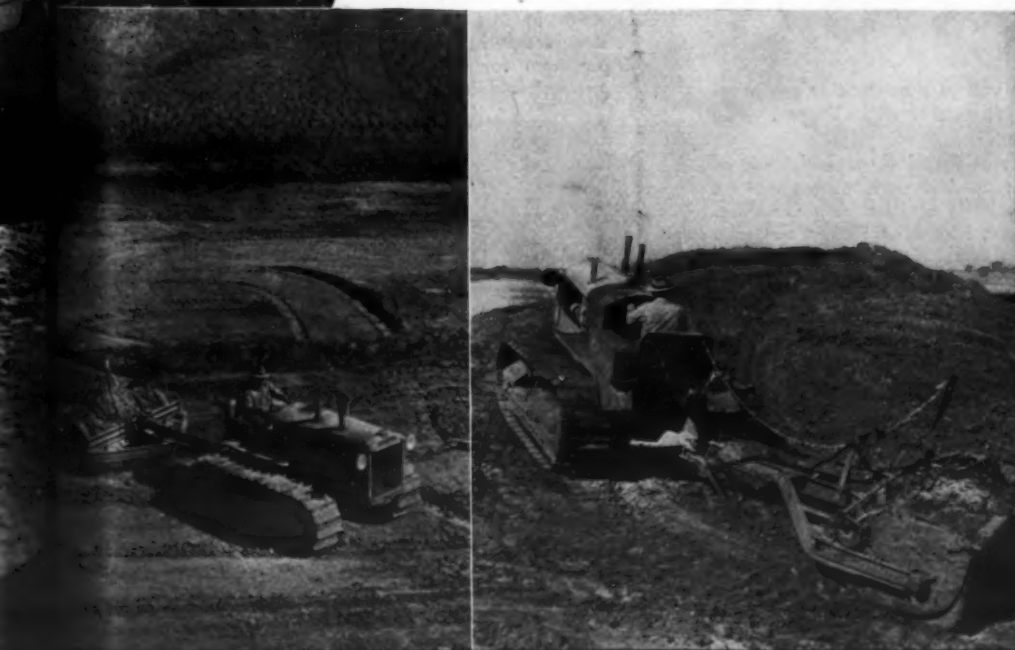
REPAIRS

... MEANS MORE
PROFIT PER YARD..
MORE YARDS PER DAY!

ON any job,—bulldozing, scraping, grading or hauling —under any condition,—sand, gravel, muck, or gumbo —in any weather,—hot, cold, rain or snow, A-C Oil Tractors are on the job, 60 minutes to the hour, piling up profits. Why? Because they're built that way.

The fundamental principle of the A-C Oil Engine is "low compression" with resulting lighter parts, smoother operation, less wear, fewer repairs and lower maintenance throughout the entire tractor. The simplicity of design, excellent workmanship and quality materials are positive assurance of long life and constant service.

That is why A-C Oil Tractors are first choice among experienced dirt movers—that is why A-C Oil Tractors are setting the pace on the country's biggest jobs—that is why you too should get the facts on A-C Oil Engine economy.



DIESEL FUEL

INJECTED WITH A DIESEL PUMP

IGNITED WITH A SPARK

Gives you:

EASIER STARTING
SMOOTHER OPERATION
LESS VIBRATION
FEWER REPAIRS

ROIL TRACTORS

Lubrication Queries

Is some lubrication problem bothering you? Tell us about it and we shall be glad to help you.

Question

We have trouble with the lubrication of the gears and pinions on our power shovel. Even heavy oil is thrown off when they are operated at high speeds. What lubricant should we use?—Lincoln, Nebr.

Answer

Don't use oil on gears and pinions. There is probably no single class of mechanical device on which lubrication is as generally neglected as it is on gears and pinions, particularly the exposed type. This can become a very costly item, as gears are subjected to intermittent pressure, sudden shocks, and often operate at high speeds. These conditions make proper lubrication difficult and if too little attention is paid to lubricating them at regular intervals, with a suitable lubricant, they will wear out. This necessitates expensive shut-downs at inconvenient times, to say nothing of the cost of the gears themselves.

There are certain definite properties which a gear lubricant should possess if it is to function effectively: 1. The viscosity of the lubricant should be such that it will insure a suitable film of lubricant between the teeth when they are meshed. It should also be such that the lubricant will not become too fluid and run off the teeth at high temperatures. 2. It should be adhesive enough so that if it is used on open or semi-enclosed gears it will not be thrown off by centrifugal force. 3. It should show as little tendency as possible to congeal, harden, crack or become brittle when used at low temperatures; or to carbonize and chip when used at unusually high temperatures.

A.I.S.C. Releases Report On Steel Wind Bents

The second report and general summary of tests and design of steel wind bents made at the Engineering Experiment Station of the Ohio State University in cooperation with the American Institute of Steel Construction has recently been released by the Institute. This paper, the second progress report, includes test data taken upon the original steel model of the lower thirteen stories of a fifty-five story three-panel wind bent, after a tall basement story had been created and later a two-story entrance.

The second progress report also contains a theoretical study of full-panel set-backs in steel design.

Electric or Belt Drive, 2 H.P. Gasoline Engine can be used on Belt Drive.



PRICE \$175

Resharpen Your Rock Bits
with a Quick-Way Bit Grinder.
Resharpen them again and again at a cost of from 2c to 4c per bit.

C. H. CARLSON MFG. CO.
13-15 Main St. N. E. Minneapolis, Minn.

New Hose for Air Tools and Drill Service

An air hose built like a pneumatic tire has been announced by the Mechanical Goods Division of U. S. Rubber Products, Inc., 1790 Broadway, New York City, for pneumatic tool and air drill service. It has "tire-like" cords laid in tough rubber cushions isolated from adjacent plies to prevent rubbing or shearing.

It is claimed that this hose can withstand any amount of pulsation, sudden expansion under pressure and constant flexing in use. It shows remarkable resistance to external blows, bruises and abrasions. This durability is said to be due not only to the internal structure but to the specially compounded brown rubber cover which will not peel when cut or gouged. For additional protection against the destructive action of hot oil in the air line, the tube of this U. S. Super Royal cord hose is made of oil-resistant rubber.

Good Roads CHAMPION SNOW PLOWS



"A Type and Model for every purpose"
ASK FOR CATALOG AND HAND-BOOK NO. 100

GOOD ROADS MACHINERY CORP., KENNETT SQUARE, PENNSYLVANIA



LeTOURNEAU EQUIPMENT moves more yardage

YARDAGES best tell the PROFIT STORY

After all is said and done you as a contractor are primarily interested in moving dirt quicker and cheaper. You want performance, not claims.

The story of the low costs achieved through the use of LeTourneau equipment is a record of performance, not on one job, but on literally hundreds of jobs from Cheshire, Massachusetts, to Forest Lawn Memorial Park, California.

Here are some typical examples of that performance:

125 PAY YARDS PER SCRAPER HOUR—at Idabell, Oklahoma, on a round trip haul of 800 feet in good loam material a 12-yard Carryall averaged 1,000 cubic yards each 8-hour shift.

72 PAY YARDS AN HOUR—at Cheshire, Massachusetts, two 12-yard Carryalls working in tandem over grades of 15 to 20% on a 2400-foot round trip averaged a complete cycle—loading, hauling, spread and return—every 12½ minutes . . . 72 cubic yards an hour. The contractor on this job owns 9 Carryalls in addition to several LeTourneau Bulldozers, Sheep's Foot Rollers and Rooters.

120 YARDS AN HOUR—at Calgary, Canada, on a round trip of 700 feet two 12-yard Carryalls moved 120 yards per Scraper hour throughout a 24-hour day.

These figures are not just single day performances, but day after day yardages moved by equipment that is built

big and rugged to deliver big yardages steadily . . . with a minimum of time out for repairs.

Contractor Designed Job Proved

When you buy LeTourneau equipment you do not have to "guesstimate" its ability to perform satisfactorily or to stand up under tough going, for LeTourneau Units are tried and proved. They were designed by a contractor to whip his own big jobs and since have been proved by successful contractors on hundreds of projects. Ask our Engineering department for data sheet proof of what LeTourneau equipment is doing.



LeTourneau 12-yard Carryall Scrapers working in tandem increase yardage 35 to 60 percent per tractor hour, cut yardage cost 25 percent and more.

R. G. LeTOURNEAU, INC.

Peoria, Illinois

Stockton, California

Cable address: "Bobletorno"

Manufacturers of: ANGLEDZERS, BULLDOZERS, BUGGIES, ROOTERS, SHEEP'S FOOT ROLLERS, CARRY-ALL SCRAPERS, POWER CONTROL UNIT, DERRICKS, TRAILERS.

• LETOURNEAU

La. "Bottomless Hole" Problem Solved

(Continued from page 18)

pillar 12-foot grader pulled by a Caterpillar Sixty at the north end and a similar tractor and an Adams grader at the south end. The track at the south end was kept a little higher above the lift being placed, which seemed to work more advantageously as it gave the draglines a higher face against which to work. The face was about 5 feet. The draglines were kept about 100 feet apart so as not to interfere with each other and to permit dumping at one and leaving the other clear to continue working.

On the dry fill the dumping and grading operations required six laborers for dumping the cars, a foreman and two men dressing slopes in addition to the dragline operators and the tractor and grader men. The Caterpillar grader was provided with exceptionally wide treads on the four wheels to prevent miring in the soft material.

Only One Structure on the Job

The only structure of any kind included in this contract was a 4x4-foot concrete box culvert 176 feet long which was built with concrete furnished by another contractor operating in the vicinity.

Track Maintenance

The item of track maintenance was very important on this contract as the track was raised continuously and the travel over the track was almost continuous. The track crew consisted of twenty men for each shift and, considering that most of the men had no previous experience in this type of work, the track maintenance went on at a good rate under the guidance of an experienced foreman. Hand-operated jacks were used for raising the track.

Labor Selected Locally

As this was an NRH contract all labor was furnished by the National Re-employment Service from the local parish, corresponding to the counties of the northern states. Some of the men came as much as 16 miles to work and unless they were able to hitch-hike they did a lot of walking for a day's work. Because of the situation of distance, the unskilled labor was worked 10 hours a day for three days a week, while skilled labor worked 5-hour shifts. The unskilled laborers changed at the middle and end of each week. The hours for skilled labor were: 7 a.m. to 12 noon, 1 to 6 p.m., 7 p.m. to 12 midnight, and 1 to 6 a.m.

Lighting for Night Work

Each dragline was equipped with a 15-kw Kohler light plant except the Monaghan, which had a General Electric lighting plant. Another Kohler plant provided light for the dump at the north end while at the south end

the current for the string of lights along the track was furnished by the Louisiana Light & Power Co. through a rubber-covered cable.

Machine Shops

At each end of the contract there were well equipped machine shops for various kinds of work required on the type of machines employed. At the north end the shop was under a galvanized iron roof and open at the sides. The shop at the south end was enclosed. The north shop was equipped with a blacksmith forge, two lathes, a small air compressor, a power hack saw, a Victor welding outfit for oxy-acetylene welding, a power drill, a U.S.L. electric welder with a Continental motor, another of which was used to provide the power for the operation of the jack shaft for all the equipment.

Costs and Quantities

It is interesting to note that when the bids were opened for this contract there were only two bidders, one on each al-

ternate of hauled embankment and one for hydraulic fill. The yardage allowed for the dry or hauled embankment was 605,760 cubic yards while the amount allowed for the hydraulic job was 798,650 cubic yards. The contract was awarded to Gifford-Hill Co. on their bid of 50.72 cents per cubic yard for hauled fill or a total of \$312,736.52, which included other minor items.

Personnel

Work on this contract, Projects NRH 173-E, U.2 and 173-F, U.2, or State Project 5403-U.2, was started Feb. 1, 1934, with clearing and grubbing and the first embankment was placed on May 1. Work at the south end was started July 1. The entire grading project was completed early in 1935. For the contractor, Gifford-Hill Co. of Dallas, Texas, J. Howard Wilson was Superintendent, assisted by Leslie Lowrey and H. M. Ford, General Foremen. George E. Rogers was Engineer for the contractor and D. F. Simmons was Resident Engineer for the Louisiana

State Highway Commission.

**PILE HAMMERS
and
EXTRACTORS
HOISTS - DERRICKS
WHIRLERS**

*Special Equipment
Movable Bridge Machinery*

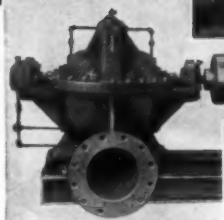
Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

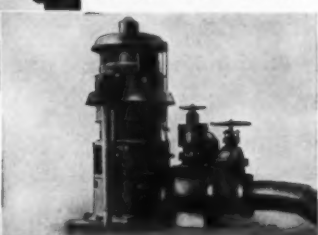


WORTHINGTON at Grand Coulee

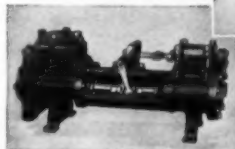
One of more than 50 Worthington Multi-V-Drives operating the big Jeffrey Conveyor System



Large Centrifugal Pump for the gravel washers



Cofferdam Dewatering Pump



Numerous small Steam Pumps are providing a variety of general services



Portable Compressor for the Rock Drilling Equipment



The time-saving Rockmaster



The Drifter, an outstanding performer

A few examples from an extensive equipment list... indicative of the scope of Worthington service at Grand Coulee

WORTHINGTON Multi-V-Belt Drives... totaling more than 7,000 horsepower... driving the giant Jeffrey Conveyor System • Worthington Vertical Turbine Type Cofferdam Dewatering Pumps • big Worthington Centrifugal Pumps for the gravel washers • Worthington Rock Drilling Equipment and Portable Air Compressors • and a further list of smaller pumps for a variety of important services • are contributing to the splendid records being set by Mason-Walsh-Atkinson-Kier, the general contractors at Grand Coulee.

Worthington is proud of this one more notable example of the wide scope of its service to the largest... and down to the smallest... construction jobs everywhere.

South Bend

**Bituminous Pressure Distributors
Street Flushers
Street Sprinklers**

Literature and prices on request

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WASHINGTON

Aluminum Paint Chosen for San Francisco Bridge

After considering black, gray and aluminum paint for the San Francisco-Oakland Bay Bridge, the engineers have decided to use two coats of rust inhibitive red lead over the structural steel work, followed by an intermediate base coat of black paint and a field coat of aluminum paint, and painters are already at work on the giant span.

Architects had favored gray paint from an appearance standpoint while some engineers preferred black because of its durability. The fact that aluminum paint is already standard for highway bridges in 27 states, that most of the bridges in the New York area are covered with this metallic paint and that it is standing up well under heavy-duty service even around salt water, aided the decision. Some favored the dark paint on the score of visibility but bright paint, such as aluminum, reflects

the sun's rays, making an aluminum painted surface actually more visible, even through fog.

New Assistants Named for FWD Staff

The appointment of Chester J. Roberts as Assistant General Manager and Robert C. Geffs as Assistant Sales Manager have been announced by the Four Wheel Drive Auto Co., Clintonville,

Wis. Mr. Roberts has had extensive experience in machine shop layouts for Nash Motor Co., A. O. Smith Corp. and Gisholt Machine Co. For six years he was Manager of the Industries and Trade Promotion Divisions of the Milwaukee Association of Commerce. Mr. Geffs has a background of fifteen years experience selling motor trucks and equipment to the commercial field. For over twelve years he was associated with White, Diamond T Motor and Highway Trailer Companies.

Boulder Nears C

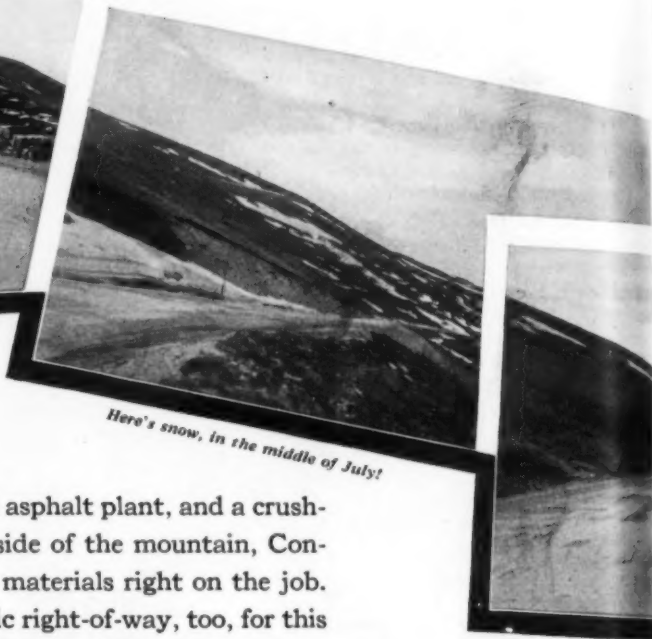
With Hoov the remaine pushed to Nevada Tunn the Upper A behind. The nels has be tion can be r excavation is



The highest point on the Fall River Pass Highway, 12,183 feet, affords a horizon of unsurpassed grandeur to motorists rolling over the fine modern pavement this road has received



Showing base treatment before final, non-skid surface was laid on the highway

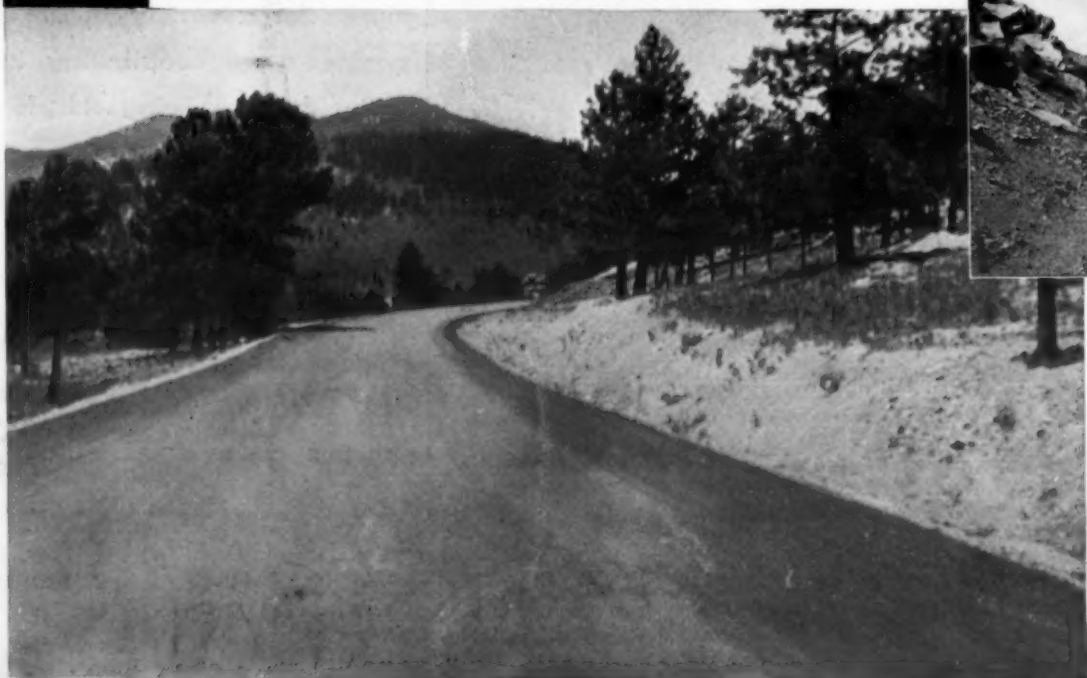


Here's snow, in the middle of July!

ASPHALT FOR PAVING...

WITH a completely truck-mounted portable asphalt plant, and a crushing plant cut, out-of-the-traffic, into the side of the mountain, Contractor C. V. Hallenbeck makes, and mixes, his materials right on the job. He carefully keeps his equipment out of the scenic right-of-way, too, for this high "trail" over the Divide has become one of the most travelled summer highways in the west.

This is but one of the high mountain highways on which Standard Oil (Indiana) Asphalt is now being used. Tennessee Pass, with an elevation of 10,240 feet, and Berthoud Pass at 11,375, were both completed in 1934, using Stanolind Cut Back Asphalt, mixed on the job. Mr. Hallenbeck also handled both these projects.



"Comin' round the mountain," and placing a light bituminous treatment on the base course surfaced road. At this point, up beyond the timberline, work is being carried on at 11,000 feet

Here's the finished highway! Easy-riding, easy on the eyes, and non-skid throughout its length. A typical Stanolind Cut Back Asphalt surface—expertly laid

With Hoover Dam finished, work on the remainder of the project is being pushed to completion. The Upper Nevada Tunnel is nearly finished, and the Upper Arizona Tunnel is not far behind. The steel lining of these tunnels has been fabricated and installation can be made as soon as the actual excavation is completed.

Although not as spectacular as some of the other work done at the dam site, the penstocks and power houses make

A new utility concrete breaker consisting of an air compressor and pneumatic breaker mounted on a Ford V-8 truck has been announced by the Concrete Cutting Corp. of America, Brooklyn, N.Y. A 30-hp Buda motor drives

This breaker is compact, weighing 10,400 pounds, and cuts a width ranging from 1 inch to 5 feet 4 inches in one operation. The manufacturer claims that it will break concrete pavement at the rate of 100 square yards per hour and a trench 2 feet wide at the rate of 50 linear feet per hour.

ASPHALT *for every Purpose*

ASPHALT FOR PAVING... ASPHALT FOR PAVING... ASPHALT FOR PAVING...

Limerock Base for Low-Cost Roads

(Continued from page 2)

the day's work and back over half of the previous day's operations.

The form boards are removed the following day and the shoulders back-filled, rolled and leveled down for proper drainage and support of the edges of the rock. Borings of the rock at 50-foot intervals are then taken to determine if the proper thickness has been secured. If necessary, rock is added where the thickness is deficient.

The final shaping of the rock is then begun. It is first scarified to a depth of not less than 4 inches. A 10-foot road machine weighing not less than 4 tons pulled by a Thirty tractor is usually employed. The rock is then alternately rolled with a 10-ton roller and machined with a 10 or 12-foot machine until the base has been brought to proper grade and section, and the surface evenly compacted.

A riding surface of unusual smoothness is attained, due to the workability of the material which permits continued planing with a road machine of long wheelbase. It has been found that a straight-edge will not serve as a satisfactory check for smoothness. Through the use of a long wheelbase road machine, a template checking the rock base shows accurately any inequalities which require correction.

Curing Under Traffic

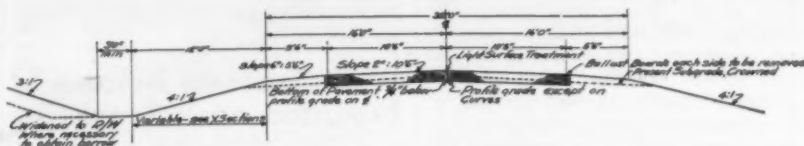
After the rock has been scarified, rolled and machined to proper section, it is placed under traffic for a curing period of approximately thirty days. During this time traffic is distributed over the base, and particularly along the edges of the rock by placing small obstructions such as short tree branches, old form lumber, etc., near the center of the road. This is important in securing maximum compaction along the edges of the paving. At the end of the curing period, which varies with weather conditions and traffic, the surface is again checked with the template for any irregularities that may have developed. These are removed with the road machine and the entire surface planed to eliminate the traffic film and permit proper penetration of the tar prime.

Surface Treatment

Tar prime of 8-13 viscosity is then applied at a temperature of about 120 degrees F. Until recently 0.25 gallon of tar prime per square yard was used. It has been found, however, that 0.15 to 0.18 gallon per square yard is sufficient. Where the base is moist, or the temperature low, the lesser quantity appears to give better penetration.

In from 24 to 36 hours, the primed base is usually opened to traffic, after any spots where there is an excess of tar have been blotted with sandy material to prevent picking up of the tar prime.

The asphalt and slag are applied in from one to three weeks, depending on the speed with which the tar prime cures under weather and traffic conditions. Asphalt of 180-225 penetration is applied at a temperature of 325-360 degrees F. In the past, 0.4 to 0.5 gallon per



Cross Section of an 8-Inch Compacted Limerock Base with Light Surface Treatment

square yard was used; however, it was found that the most satisfactory cover was secured with a minimum of asphalt and now about 0.35 gallon per square yard is used with excellent results.

The asphalt is immediately covered with slag at the rate of 40-42 pounds per square yard. The slag ranges in size from $\frac{1}{4}$ to $\frac{3}{4}$ -inch with at least 80 percent retained on a $\frac{1}{2}$ -inch screen.

Slag, because of its shape, texture and hardness, has been found to be more satisfactory than gravel or crushed stone in limerock pavement construction. The slag is spread with mechanical spreaders and is then dragged with a broom drag and rolled with a 3 to 5-ton tandem roller.

Georgia's 8-inch limerock base is generally accepted as a high-type standard of paving, comparable with practically any other type, and is giving excellent service.

Works Progress Highway Fund programs have been received by the U.S. Bureau of Public Roads from Michigan, Alabama, New York, Wisconsin, Colorado, Arkansas, Mississippi, Oregon, Idaho, South Carolina, District of Columbia, Washington, Utah, Missouri, Vermont and South Dakota.



A BAKER DIRECT-LIFT BULLDOZER

Hitch Your Tractor To Dependable Equipment

Find out about the new Baker Bulldozers with important new features which cut down your operating costs. Ask for special bulletins on any of the many Baker Products.

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GRADEBUILDERS
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THE BAKER MFG. CO.
585 Stanford Ave., Springfield, Ill.

Why these Channel-light Supports were built of Bethlehem Piling



HERE is an interesting and unusual application of Bethlehem Steel Sheet Piling.

Four channel lights at Cohasset Harbor, Mass., supported on timber piles, had long been a source of trouble and expense. Ice conditions here are so severe that the timber piles, exposed to the tremendous pressure of moving ice masses, lasted only from one to four years.

To eliminate the expense of such frequent replacements, the U. S. Lighthouse Service decided to build supports staunch enough to withstand the pushing and battering of the ice year after year with little maintenance. The timber-pile structures were therefore replaced with cylinders built of Bethlehem Steel Sheet Piling.

The steel-piling cylinders are 14 ft., 10 in. in diameter, and are filled with sand and gravel, topped with concrete. The Bethlehem Piling, in lengths of from 25 to 30 ft., was driven through sand and gravel to rock ledge, which in the case of the cylinder shown at the left was reached at 14 ft. below mean low water.

In this situation, as in many another, Bethlehem Steel Sheet Piling offered the simple, economical way of meeting the conditions involved. Perhaps right now you are planning some job in which the use of Bethlehem Piling would result in greater permanency, and substantial savings in construction costs.



KALMAN STEEL CORPORATION

Subsidiary of Bethlehem Steel Corporation

GENERAL OFFICES: BETHLEHEM, PA.

District Offices: Albany, Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Cincinnati, Detroit, Houston, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Syracuse, Washington. Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu. Export Distributor: Bethlehem Steel Export Corporation, New York.

Engineers: U. S. Lighthouse Service, District No. 2, Captain George Eaton, Supt.
Contractors: Blakeslee Rollins Corporation, Boston.

BETHLEHEM Steel Sheet **PILING**

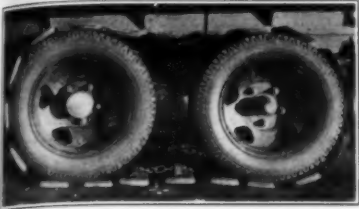
COMPLETE CUTTING AND WELDING APPARATUS

for all types of light and heavy work. Torches, tips regulators, hose, goggles, gloves, lighters and wrenches. Low prices—highest quality materials and workmanship.

Write for catalog

The Alexander Milburn Co.

1400 W. Baltimore St. Baltimore, Md.



The Hipkins Tractioneer Applied to the Rear Wheels of a Six-Wheel Vehicle in the Form of a Half-Track

New Traction Device for Dual-Tired Trucks

A device to make it easier to operate dual-tired pneumatic trucks of either 2, 4 or 6-wheel drive through muddy or soft terrain has been announced by the By-Products Steel Corp., Coatesville, Pa. This Hipkins Tractioneer consists of a series of U-shaped pressed steel shoes with V-shaped brackets on the backs of the shoes that fit into the groove between the two tires of the wheel. Through the brackets a connecting chain of the length required by the wheel circumference is passed, so that the entire assembly is flexible and can adjust itself to variations in contour of the ground.

Power is transmitted from the tire treads through the steel shoes so that there is no torque strain on the parts connecting the steel shoes. As the wheels revolve, the Tractioneer creeps around them, thus preventing undue wear on any part of the tires or the Tractioneer itself. The device is so constructed, however, that the wheels do not spin. Installation of this device is a one-man job and requires about 10 minutes, while it can be removed in 5 minutes. If the vehicle is stuck in mud, it is possible to apply the Tractioneer without jacking up the wheels. The Tractioneer has been tested extensively at the Aberdeen Proving Grounds of the Ordnance Department, U. S. A., in Maryland with a 1½-ton vehicle loaded to capacity and run over a mud course, first without chains or Tractioneer, and second with chains on the rear wheels, and last with the Tractioneer on the rear wheels. Without chains or the Tractioneer, the slip was 25.7 per cent. With chains on the rear wheels, the slip was reduced to 22.6 per cent. With the Tractioneer on the rear wheels, the slip was only 5.3 per cent. At the same time, the drawbar horsepower of the vehicle was greater when equipped with this device.

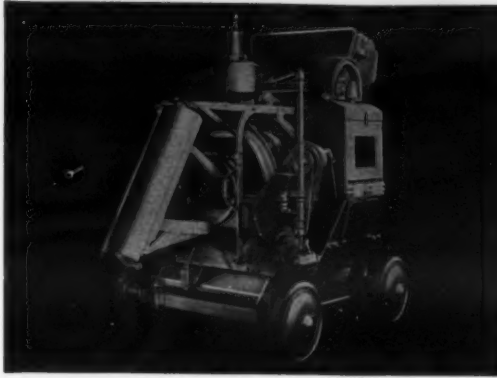
All-Wheel-Drive Trucks for Off-the-Road Work

A new and complete line of 4 and 6-wheel-drive motor trucks, ranging in gross capacity from 8,400 to 52,000 pounds, has been announced by the Marmon-Herrington Co., Inc., Indianapolis, Ind. These trucks are specially adaptable for off-the-road performance and combine the service of the ordinary rear-wheel-drive truck with the sure footness of the track laying tractor.

The initial announcement of this line includes twenty-one models. Thirteen of these models are four-wheel-drive vehicles, ten with gasoline engines and three with diesel engines. The remaining eight models are six-wheel-drive units and of these eight, five have gasoline engines and three diesel engines. The four-wheel-drive models range in gross capacity from 8,400 to 31,200 pounds and the six-wheel-drive models from 26,500 to 52,000 pounds. A low center of gravity features the new line

with dual rear wheels as part of the standard equipment for each truck.

PRODUCTS OF EXPERIENCE



A COMPLETE LINE

MODERN DESIGN

LOWER PRICES



Write for new bulletin on Wonder Tilting Mixers, Hoists, Pumps, Wheel Barrows, Master & Silverstreak Drum Type Mixers, Saw Rigs, Plaster and Mortar Mixers, Concrete Carts.

CONSTRUCTION MACHINERY CO.

500 Glenwood St.
Waterloo, Ia.



Standard Asphalt Binder "C"—Pen Macadam, Socony Brand, Mohawk Trail, past the Summit on Charlemont side.



Standard Asphalt Road Oils
Standard Asphalt Joint Fillers
Standard Waterproofing Asphalt
Standard Cut-Back Surfacing Asphalt
Standard Asphalt Binder A for surface treatment
Standard Refined Asphalt for sheet asphalt paving
Standard Cold Patch Asphalt for all types of patching
Standard Asphalt Binders B & C for penetration work (Asphalt Macadam)
Standard Paving Asphalt 51-60 and 61-70 Penetration for the mixing method (Asphaltic Concrete)
Standard Asphalt Emulsion for Surface Treatment, Penetration, Road and Plant Mix, and Patching
Specifications and all other particulars furnished on request.

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STANDARD OIL OF NEW YORK DIVISION

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fella!**

This new ½ Yd.
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Send for FREE
copy of
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GOPHER
SHOVELS"
Illustrated
Action pictures
"on the job"



AMERICAN HOIST & DERRICK COMPANY
Manufacturers of
CONTRACTOR'S, INDUSTRIAL
AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

A New Road Shaper on 4-Wheel Chassis

The new Gledhill road shaper, recently announced by the Gledhill Road Machinery Co., Galion, Ohio, is a medium-weight low-cost machine and a balanced load for a 1½-ton truck at speeds up to 35 miles an hour and can operate at higher speeds. While in general appearance this new unit is similar to the Gledhill road adjuster, it is different in size and weight, has two straight-edges instead of one, and is more distinctly a maintenance machine.

The two blades are set at opposing angles to eliminate side draft. The two straight-edges, one at each side, keep the blades true and even so that the roads are shaped to a true level, with bumps planed off, ruts and hollows filled, leaving a firm even surface. A four-wheel chassis with pneumatic tires, hydraulic lift and Timken tapered roller bearings carries the mechanism and keeps it in accurate adjustment.

This unit is adaptable for leveling road surfaces, drives, berms, aviation fields or any similar surface of bladeable material. It is also suited for leveling black-top and in maintaining traffic-bound macadam.

A 10-Minute Course on Stabilized Roads

An outline which will be very helpful to road officials interested in low-cost road improvements through stabilization with binder soil and calcium chloride has been published in Bulletin No. 22 by the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich. The bulletin covers definitions, history, principles, the function of calcium chloride and definite data on construction, maintenance and costs of stabilized gravel roads.

Bulletin 23, available from the same source, tells of the importance of crown on calcium chloride stabilized roads and contains helpful data on the various types of crowns as well as a list of stabilized projects.

Dowel and Joint Spotter Speeds Concrete Road Work

A dowel and expansion joint spotter which will install dowels, tie bars, expansion joint and marginal bars all at one time, or one or more as required, has been placed on the market by the Heltzel Steel Form & Iron Co., Warren, Ohio. This device is adjustable throughout and will install bars of any diameter for any crown or depth.

The device is so assembled that it is

10S SPEED KING

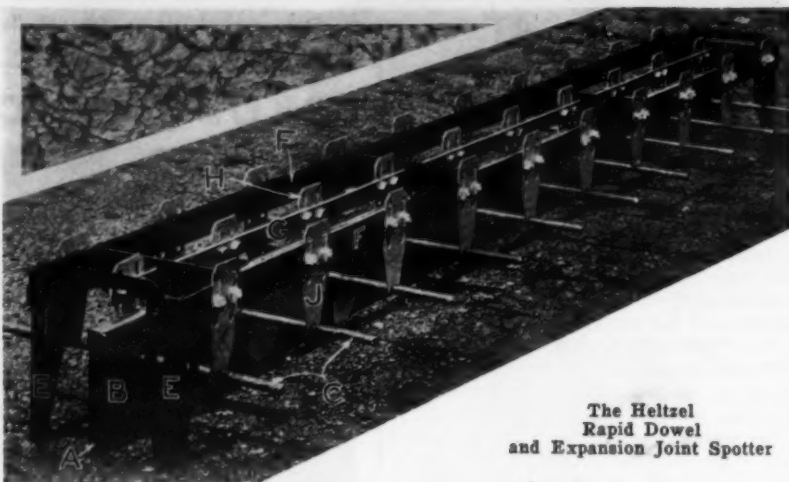
2-Bag End Discharge Mixer discharges direct or with swinging spout, beats all records for mixing and placing concrete.



ALSO
BUILT IN
75 SIZE
POWER
LOADER OR
LOW
CHARGE

Get our low
prices on Tilters
and Non-Tilters.

THE JAEGER MACHINE
CO., 701 Dublin Ave., Columbus, O.



The Heltzel
Rapid Dowel
and Expansion Joint Spotter

held at the proper elevation by the end legs, E, with the adjustable plate, J, holding the dowels at the proper elevation and the center plates, H, lining up the expansion joint holder, B, which remains in the concrete until the finish-

ing machine passes over. Two or more of these holders are usually purchased with each spotter so that when it is loaded alongside the road, there is no delay in waiting for the pulling of the last holder by the joint finishers.

Marginal bars may be placed on top or under the dowels or tie bars. This device is illustrated and prices given for various sizes in Bulletin Q-6 which may be secured from Heltzel.

CONCRETE VIBRATORS

Air operated vibrators for all classes of concrete construction including Bridge deck slabs, Dams and Locks, Highway pavement and Concrete products.

Write for circulars and engineering data.

MUNSELL CONCRETE VIBRATORS

997 West Side Ave. Jersey City, N. J.



42 Hours to install this I-Beam-Lok Floor



Standard paver and material trucks operating on unfilled I-Beam-Lok

*If you want
SPEED!*

The rugged design of I-Beam-Lok and arrangement of steel at upper surface permit use of the floor as soon as unfilled units are laid and welded.

In 3 working days, 2 seven-hour shifts each day, with 2 crews, one working from either end, 1400 lineal feet of I-Beam-Lok Armored Bridge Flooring, 18' 8" wide, was installed on the downstream side of the Market Street Bridge, Harrisburg, Pa. Later, on the upstream side, only two days were needed, each crew laying 350 lineal feet per day!

I-Beam-Lok has many advantages, aside from its speed of installation. It is light in weight, yet extremely rugged, as it takes advantage of the strength of the I-Beam. The completed concrete



35 Hours were required for concreting

surface is armored, anti-skid, long wearing and free from the possible development of progressive cracks. Send for illustrated booklet.

333

I-BEAM-LOK
Armored

CARNEGIE

STEEL COMPANY • PITTSBURGH

United States Steel Corporation Subsidiary

Pacific Coast Representatives:
COLUMBIA STEEL COMPANY
San Francisco

Cushioned Concrete on Oklahoma Job

(Continued from page 1)

the grade. When not engaged at that the operator sprinkled the grade to lay the dust and give better compaction under the roller.

A fine grade crew of about eight men "manicured" the grade, checking with a template until it was of proper cross section and the standard 1/4-inch high. The man who oiled the forms went back and set the marginal bars, the lower one 3 inches from the bottom of the slab and the upper 3 inches above the lower. Both were of deformed steel and placed 6 inches from the forms.

The expansion joints, placed every 90 feet with dummy joints every 30 feet between, were 1 inch wide and poured with asphalt after curing was complete. They carried cross dowels every foot of 3/4-inch bars 2 feet long dipped in asphalt and one end covered with a metal cap. The dowels were tied to two transverse bars 1/2-inch in diameter and 6 inches from the joint on either side. The dummy joints were made up the same as the expansion joints with the dowels but without the caps. The center steel duplicated the dummy joints but the bars were continuous and the cross dowels were not dipped. The longitudinal rods of the center joint were threaded through the push and trail graders and run onto a wood sled with marks for the spacing of the dowels which were placed and wired as the paver pulled ahead. The spacing was 1 foot. After the wood sled was pulled ahead both ends of each dowel were supported with wire bar holders.

The contractor designed a special novel device for holding the marginal bars. It was so made that as the puddler lifted on the handle it released the projecting rods that held the bars and the device was lifted vertically clear of the concrete.

Four steel men handled the steel, two passing steel and two placing it on the supports.

Two Graders on Paver

The Koehring 27E paver carried a Carr Push Planer in front and a Koehring trail grader in back, giving a clean-cut accurate final grade. The push plane had a V plow in the center and a pair of short blades at either side so that the excess material was windrowed for the two grade men to shovel out as it accumulated in front of the trail grader.

Five gallons of water per sack of cement added at the paver gave a uniform slump of 2 1/2 inches.

The puddlers were divided into two pairs, one pair between the forms and the other pair on the outside working chiefly on spading. An Ord finisher followed the puddlers and pulled a 2-wheel trailer on which was mounted a single large cutter wheel for the center joint slot. It was placed in the concrete to cut on the first run and the operator placed the sheet metal parting strips immediately. Then on the second pass of the finisher it covered up the metal strips completely.

Finishing by Hand—Curing

The longitudinal float was made of sheet steel bent to channel section and



C. & E. M. Photo

The Cutting Wheel for Center Strip

with the usual plow handles for the operators. The rolling twin bridges carried the two-handled cutter for the dummy joint in front and the float men cut

the dummy joint and placed the dummy steel. These same men also used the first belt. The second pair of finishers used Heltzel drag straight-edges and edged the slab. The joint finisher brought up the rear of the procession and pulled the expansion and dummy joint steel.

Two men placed wet burlap on the finished slab from a rolling bridge. The burlap was removed the next morning

and the slab covered with earth and wet for 10 days.

Personnel

NRH 157G, 3 miles in length, was awarded to S. O. Maxey & Co. of Durant, Okla., on a bid of \$82,919.41. The work was in charge of Guy B. Maxey for the contractor and J. R. Keeth was Resident Engineer for the Oklahoma Highway Department.



Powerful, economical machines are these Sauerman Drag Scrapers and Slackline Excavators. They will span an area 1,000 ft. or more in width and move materials from any point in this

area at a rapid rate. There is a special type of Sauerman machine for underwater excavation, another for digging from a bank, another for cut-and-fill work, and so on.

Write for 56-page Catalog

SAUERMAN BROS., 464 S. Clinton St., CHICAGO

★

IN THE SHOP

ALEMITE

Provides

QUICK, CONVENIENT,
LOW-COST LUBRICATION

"IT'S A CINCH TO LUBRICATE ANY PIECE OF CONTRACTORS' MACHINERY WITH THIS PORTABLE ALEMITE 'ROCK CRUSHER' POWERGUN"

This HR-32 Heavy-Duty Electrically Operated Alemite Powergun has a lubricant capacity of 32 pounds. It develops 4500 pounds of lubricant pressure at hose outlet with its 1/2 H. P. motor.

Cuts Costs—Saves Time for Contractors

Contractors and highway maintenance departments are saving time and money by lubricating their equipment in their shops and garages with Alemite Portable Powerguns. These guns are handy—easy to move about through narrow spaces. And they develop plenty of power for the most difficult lubrication jobs. Alemite Powerguns are made to be operated by electricity or by air, developing lubricant pressure 32 times the air pressure.

Whether you lubricate your equipment in the shop or out on the job, you'll keep your upkeep down to a minimum if you use Alemite Powerguns.

FREE CATALOG

Let us send you a catalog with complete information on Alemite Powerguns and Service Equipment. It has everything you want to know, including prices. It's free, and you are not obligated in any way.

ALEMITE CORPORATION

(Division of Stewart-Warner Corp'n.)

1850 Diversey Parkway

Chicago, Illinois

ALEMITE *Temptrite*
SPECIALIZED LUBRICANTS
and
LUBRICATION EQUIPMENT



2" Self-Priming Centrifugal Pump

Easily carried by one man; 100% automatic. No handles or petcocks to be adjusted—weighs 98 pounds. Four-cycle engine with oil reservoir in crankcase.

Easy to start—Speed control—Air cleaner. Foot and rope starters—self-oiling. Engine has only one place requiring lubrication.

Ask for Specification Sheet 20A. Marlow Pumps, Ridgewood, N.J.

Road Maintenance and Safety

By C. W. McCLAIN
Engineer of Maintenance, Indiana State Highway Commission

THIS embraces a large field of maintenance activities and is becoming increasingly important as vehicle speeds increase. Placing and upkeep of markers and signs, both plain and reflector type, center line and traffic lane strips, railroad protective devices, snow and ice removal, flood control emergencies, regulation of traffic in weight, length, height and width, are some of the problems usually assigned to the maintenance division of state highway departments.

Markers and Signs

Under this heading falls the large amount of information which must be imparted to the traveling public while it is in motion, presenting a literal instance of reading while you run. Two methods are used to impart this information speedily and accurately; by symbols or words or a combination of the two. The tendency now is to use symbols wherever possible and, in my opinion, this tendency has gone too far. A few well-chosen words combined with the proper symbols are much safer and far more reliable to convey the proper message to the traveler.

The use of reflector buttons in road signs has gained much recognition and rightfully is gaining more. A word of warning should be issued to those buying signs that various makes of buttons vary greatly in their ability to reflect light. It should always be borne in mind that any road is better unsigned than poorly signed. A driver on a signed road has the right to expect that all hazards are marked, and in addition that all similar hazards are marked uniformly. If the road is unsigned, the driver recognizes the increased risk, is more alert and proceeds with greater care.

Pavement Striping

This safety measure has not had enough attention. Effort is being made to increase the effectiveness of center and multiple traffic lane marks for night driving. We have experimented with white and yellow traffic paint and also bituminous material. The paint lines are effective for the driver under his own lights, but fade out under lights of approaching cars just when he needs the added protection most. To eliminate this objection, we have gone to cut-back asphalt, adding about one and one-half pounds of powdered asphalt to the gallon. This does two very desirable things; it leaves a very glossy surface which shines under light and, because of the quick drying effect of the asphalt powder, eliminates the use of sand covering. The work is done best when the air temperature is not over 35 degrees F. Some criticism is made because the line is slippery when wet, but the small width involved minimizes danger of prolonged skidding and the slight skidding involved tends to discourage traffic from crossing the line except when necessary.

Another effective method, especially on black pavement, is the cut-back asphalt line followed immediately with fine white limestone screenings. This makes a very lasting line and depends on its white color and some appreciable thickness for its effectiveness.

A mark along each edge of the pavement and none in the center is getting some attention. It is claimed that the edge is easier to follow than a center line. As long as our motor vehicles are left-hand drive, it seems that the center line is preferable.

Railroad Protection Devices

It is obvious that grade separations, however desirable, will never catch up

with the urgent need for protection at rail and highway crossings. To supplement this remedy and speed up protection many devices have been developed.

There has been a great improvement in the reliability and effectiveness of alternating flasher lights and also in the wig-wag type. Great improvements have also been made in the design of gates. One of the newest devices is a motor-controlled positive barrier which comes up from the pavement level to a sufficient height to stop traffic when a train is approaching.

Emergencies

Under this heading are such activities as adequate warnings at flooded locations, removal of debris after storms and wrecks and in many cases first aid to the injured, all of which problems need an individual solution to meet the special requirements of each case.

Apalachicola Bay Bridge Nearing Completion

The Apalachicola Bay Bridge, at Apalachicola, Fla., various phases of the construction of which have been described in a series of articles concluded in our August issue, will soon be completed. The formal opening will probably take place next month.

The work as a whole, covering the original five contracts, is now practically completed and a later contract, F, for the paving of the embankments and the mile of new approach highway, is scheduled for completion by the end of the month.

According to E. S. Fraser, Project Engineer for the bridge, the bridge layout has been modified by moving Section 3 of the bridge work westward 3,000 feet, making it continuous with Section 2 and eliminating the middle of the Bay fill, the east fill being extended to the new bridge head.

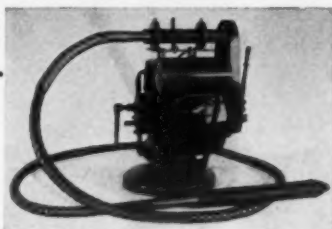
Although bad weather delayed progress somewhat during the past month, things went rapidly up to that time. The contractor for the pouring of the spans and hand-rail made a record of 88 spans poured in May and 5,350 feet of hand-rail in June.

A New Churn-Type Drill

For holes up to 300 feet in depth and to 6 inches in diameter the Bucyrus-Erie Co., South Milwaukee, Wis., has announced the new Bucyrus-Armstrong 21-W churn-type drill of welded all-steel construction, capable of handling a thousand pounds of tools. It is equipped with a rubber shock absorber, making practical the effective use of wire line; and ample power is furnished by a heavy-duty, 4-cylinder industrial gasoline engine. It is a one-man drill, simple in construction, easy to set up and easy to operate, requiring little adjustment and minimum maintenance.

Choice of mounting is available: on a truck; as a two-wheel or four-wheel trailer; or for team or tractor haul. It may be mounted on a drill boat by simply removing the wheel mounting and

then setting the machine on two skids. It is appropriate for use in small quarries and on construction. For heavy drilling in large quarries, the crawler-mounted Bucyrus-Armstrong 26 or 29-T electric blast hole drills are recommended by Bucyrus-Erie but the considerably lower price of the 21-W makes it a desirable machine in lighter drilling and where holes of 6 inches or less in di-



Concrete VIBRATORS and Grinders
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART, INDIANA

ameter give satisfactory results. It is said to equal the speed of the larger drills mentioned on small hole work.

NO SHUTDOWNS with a HOBART

The New Hobart Engine Drive Arc Welder

No longer need broken equipment hold up your jobs—the Hobart 40-Volt Welder will let you handle repairs in short order—it is big enough to handle your steel construction work. Ask for your copy of "The Many Profitable Uses of Simplified Arc Welding." No obligation.

HOBART BROS.

Box CE95, Troy, Ohio

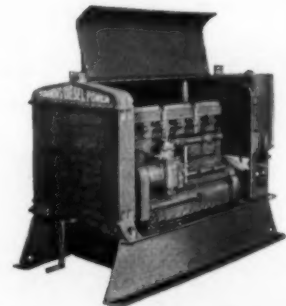
WRITE TODAY for FREE BOOKLET

CUMMINS

DIESELS for digging ditches

Owned by PRODUCTIVE PROPERTIES, INC., operating in the Sacramento River Delta lands of California.

Digs 1 1/4 miles
22 in. wide—5 ft. deep
in 8 hours
... total fuel cost
80¢



CUMMINS Diesel "HP" Power Unit—a complete, compact power plant. Made in 4 and 6 cylinder sizes—55 and 85 H. P. Write for descriptive Bulletin H-104.



A CUMMINS "HP" Power Unit—6-cylinder, 85 H. P.—installed on this Buckeye Ditcher made a simple power conversion and has resulted in a big reduction in operating cost. It will pay you to investigate CUMMINS Diesels for all types of mobile and stationary equipment.

CUMMINS ENGINE COMPANY, COLUMBUS, INDIANA
—The Leader in Diesel Engineering Advancement
SALES AND SERVICE FROM COAST TO COAST

UNIVERSAL CRUSHERS

on the job mean lower costs, greater savings, bigger profits.

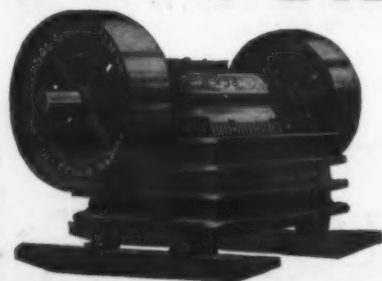
FARM TO MARKET ROADS

Thousands of miles will be built to make travel cleaner, safer, and all-weather, all-the-year-round.

High grade surfacing materials, stone or gravel, can be speedily produced with Universal crushers and crushing plants. Ready portability is essential for economical road construction. We have it in great variety.

CRUSHERS, SCREENS, CONVEYORS, BINS

Over 50 combinations. Tell us your needs.



UNIVERSAL CRUSHER COMPANY 620 C AVENUE W., CEDAR RAPIDS, IOWA

1,600 Miles of Traffic Lines Repainted in N. J.

In an attempt to curb reckless driving, 1,600 miles of traffic lines on state routes in New Jersey are being repainted. It is usually necessary to renew the lines about twice a year. The cost is slightly more than one-half cent a foot each time, with 7,121,365 feet of 6-inch stripes and 1,214,849 feet of 12-inch stripes painted on the thoroughfares. About 52,000 gallons of paint are used.

Heath Appointed Manager of Amplex Div. Sales

The Amplex Division of Chrysler Motors, Detroit, Mich., has announced the appointment of Harry E. Heath as General Sales Manager for this Division which specializes in marine and industrial activities. Mr. Heath has been with the Chrysler Corp. since 1928.

A Long Road to Travel

It would take a motorist driving 45 miles an hour steadily for 10 hours a day 13 years, 10 months and 21 days to travel over all the improved roads in the United States, a newspaper clipping declares. More important is the fact that it would take a motorist, driving 30 miles an hour if possible, more than

33 years, 5 months and 2 days to travel all the unimproved roads in this country, not allowing time out for mudholes in the spring.

Light Up Your Job

—with this new, guaranteed 5 K.W. D. C. (5000 Watt) direct connected generating plant.

Only \$395.00 F.O.B. Milwaukee

Weight complete, 660 lbs. Immediate shipment can be made.

Let us send you literature

LeRoi Company
Milwaukee Wis.



Special Selling Event USED AND NEW ARC WELDERS

Here's a chance to start getting the big savings arc welding offers you. Why wait any longer? With an arc welder you can do any construction or repair job easier, faster and at a fraction of the cost of other methods. You may (as others do) save enough on just one job to get back all the money you spend for a welder. Then you go right on saving—probably thousands of dollars a year. Many contractors are doing it. So can you!

Start saving now with one of these bargain welders. For particulars and prices, write
P.O. Box 5758, Cleveland, Ohio

Employ TRUSCON

FOR YOUR CONCRETE ROAD CONSTRUCTION



And you will obtain

1. Economy in road building
2. Roads that hold together
3. Safe roads
4. Permanent roads
5. Roads that aid in keeping accidents to the minimum

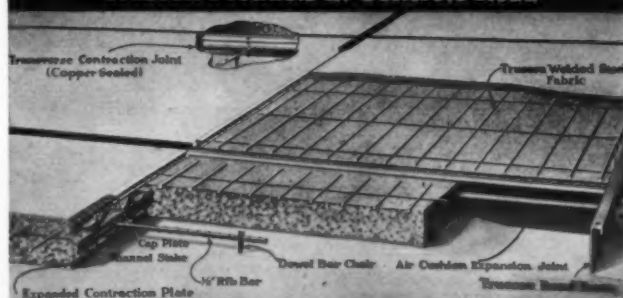


Included in the complete line of steel products which Truscon manufactures for concrete road construction are the following: Welded Steel Fabric for producing permanent and wear-resisting surfaces; Road Forms for durability and economy; Expansion Joints and Contraction Plates to relieve stresses in concrete bases and provide straight, regular cracks where the concrete expands or contracts; Rolled Steel Bars for supplemental reinforcing at roadsides and crossroads; Curb Bars and Edge Protectors; Guard Rails for highway protection and safety.

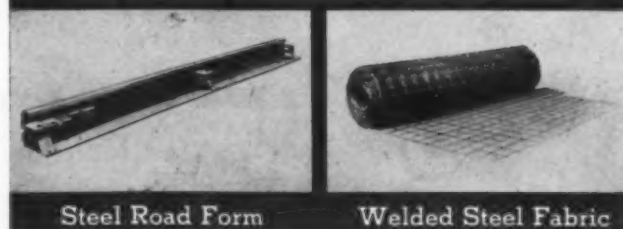
Safety, economy, modern road building! Trusconize your roads and you get all of these important elements. Write today for full information on all Truscon highway products.



Truscon Products in Concrete Road



The Modern Trusconized Concrete Road



Steel Road Form

Welded Steel Fabric

TRUSCON
STEEL COMPANY
YOUNGSTOWN, OHIO



The New Ayrgo Material Cart

New Cart for Aggregates, Cement or Concrete

A new, modern two-wheel cart for transporting bulk cement, sand, wet concrete and similar materials has recently been announced by Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.

This Ayrgo cart has an all steel sheet welded body, with all-steel wheels equipped with pneumatic tires; Timken roller bearings and full control handles. Its actual capacity is 11 cubic feet liquid measurement and it is designed to handle the complete discharge of a 10-S mixer. The design of the cart permits the scooping of bulk cement or sand with the cart itself, by running the scooping lip of the body into the material and bringing the cart to an upright position.

The body of the cart is high enough from the ground to pass over ordinary obstructions and the pneumatic tires and Timken bearings make it easily handled by one man.

New Dealers For Union

Union Iron Works, Inc., Elizabeth, N.J., has announced the appointment of three new dealers to handle Union pile hammers and pile driving equipment, airlocks, tunnel shields, concrete buckets, grout mixers and ejectors, shafts, cages, etc.: Thorman W. Rosholt Co., Minneapolis, Minn.; Brown Bevis Equipment Co., Los Angeles, Calif.; and Equitable Equipment Co., New Orleans, La.

O.K. AMERICAN



Easy pickings for an American Gopher 1 1/4 Yd. Shovel. Dipper manganese construction, renewable and reversible tooth points, rake of dipper easily adjusted.

Contractors and engineers say "O.K. American" of our complete line of American Gopher Shovels... Cranes... Draglines.

Send for FREE copy of "American Gopher Shovels" illustrated... action pictures of American Shovels "on the job."

AMERICAN HOIST & DERRICK CO.

Manufacturers of
CONTRACTOR'S, INDUSTRIAL
AND RAILROAD EQUIPMENT
ST. PAUL, MINNESOTA

READ THIS LETTER, MR. CONTRACTOR!

HERE is a contractor who has had so much success with his Ford V-8 Trucks that he is now using a Ford V-8 engine to drive his welding generator. His letter gives you all the proof you need of V-8 Reliability, V-8 Economy, and V-8 Performance both as a truck engine and as a stationary power plant.

THEN MAKE YOUR OWN "ON-THE-JOB" TEST

Lindsley Brothers are enthusiastic V-8 boosters. In this respect, they are in complete agreement with hundreds of other contractors all over the country. But Ford does not expect you to buy a Ford V-8 Truck without first knowing what it will do for you. Your Ford dealer is ready to let you make an "on-the-job" test with your own loads, over your own routes, with your own driver. Without cost or obligation, he invites you to make your own test of V-8 Performance, V-8 Economy and V-8 Reliability. Call him today!

LINDSLEY BROS.

PORTABLE
ELECTRIC AND ACETYLENE
WELDING
ENGINEERS AND CONTRACTORS

Ford Motor Company
Detroit, Michigan

Gentlemen:

In June 1934 we purchased a model 40 V 8 Ford Motor and mounted it to drive a four hundred ampere Lincoln Shield arc welding generator and have had remarkable success with this motor.

Up to this date we have run this motor a little over eight hundred hours at a speed of approximately forty miles per hour and have spent sixty cents on it for repairs, we run it one hundred hours on an oil change without adding any additional oil during that time.

Our gasoline consumption has been very low, on a test run it burned fifteen gallons in twenty-two hours continuous running which is considerably lower than other motors we have used for this purpose.

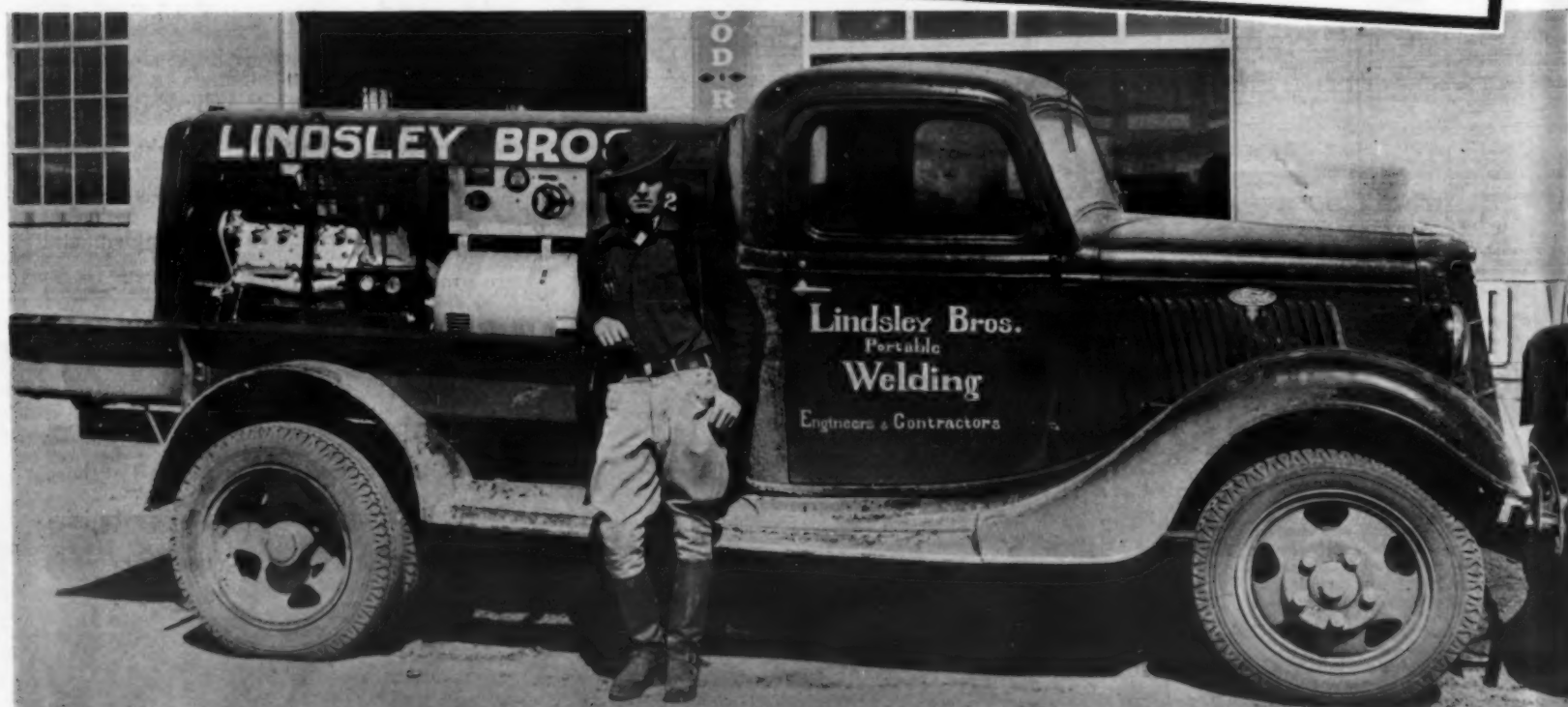
One feature especially is the starting in cold weather, we used this machine all through the winter on outside work when it was twenty and thirty degrees below zero and had no difficulty whatever in starting.

In February of this year we decided to build another portable welding machine and bought a 1935 V 8 motor to drive the welding generator and a 1935 V 8 truck to mount it on. We have proved to our satisfaction that there is no motor car or truck on the market to-day that will give the service that will the Ford V 8. Anyone familiar with the welding business, and especially our line where we sometimes work a hundred miles from any source of repairs, will appreciate dependable equipment such as we have found Fords to be.

Very truly,

LINDSLEY BROS.

L. L. Lindsley



FORD V-8 TRUCKS

Conn. Plans Ahead to Lick Icy Roads

(Continued from page 7)

than a coating of sand spread uniformly over the surface. On a heavily traveled highway, during bad weather conditions and in the night period, double units increase traffic hazard and slow the operation of the trucks.

In this State it is customary to sand grades, curves and approaches to railroad crossing, schools and intersections. Tangents are not sanded, in general, although some particularly bad local condition may cause a change in the general rule.

It has been determined that there is a correct amount of sand which can be used to accomplish the best results. Too light a coating does not offer sufficient resistance, while too heavy a coating seems to accelerate, rather than to retard, skidding action.

Calcium Chloride Used

Under low temperature conditions, and particularly on east and west highways, where the winter sun does not reach the roadway surface during the day, it is customary to use calcium chloride to cause the sand to stick to the icy surface, and prevent the sand from being thrown to the outside of the highway by the suction of passing cars. Experience seems to show that the most valuable results are obtained if the calcium chloride is applied directly to the icy surface, followed by the coating of sand. By this method the sand clings to the road surface to a greater extent than when a pre-mixture of the sand and chloride is used. The latter method, however, is valuable under certain conditions, and tends to retard the freezing of the stockpiles along the road.

Distances and Costs

Lengths of highway covered by trucks vary, the assigned distance being governed wholly by local conditions, number of areas to be sanded, width of highway, and amount of travel. On the Boston Post Road a truck may be scheduled for a 3-mile length of 40-foot highway, while on a secondary road, with comparatively few hills and curves, a truck may be scheduled for a 10 to 15-mile length.

Costs for this work vary greatly in

accordance with climatic conditions. For the fiscal year ending June 30, 1933, the amount spent for sanding and removing ice on state highways was \$116,590.88, while in the fiscal year ending June 30, 1934, \$142,050.09 was expended. The state highway mileage in Connecticut, as of June 30, 1934, was 2,440.15 miles.

New Truck Engine Tested At High Altitude in West

A new engine in the motor truck field recently finished an altitude test run in Rocky Mountain National Park, Colo. This Waukesha-Hesselman oil engine, mounted on a Stewart Model 48 truck, is the first American attempt to apply a six-cylinder Hesselman engine to automotive service. Prior to a demonstration run through the eastern states and middle western manufacturing centers, the truck was put through its altitude trials last July.

On the altitude test run, the truck was driven from Waukesha to Glenwood Springs, a distance of 1,283 miles, and averaged from 9.5 miles to 12.25 miles per gallon, depending upon the altitude and grade, with its full rated load. In this test, a 26 per cent grade was encountered at an altitude of 8,000 feet which the truck negotiated for 1½ miles to the summit with 800 pounds load beyond the normal rated capacity. The water temperature during the entire test period, more than three weeks, did not exceed 180 degrees F. The maximum altitude reached on the outward trip was 12,183 feet, and while it was found that the normal anticipated power loss was encountered, no overheating or unusual operating difficulties were experienced, according to the manufacturer's report. On the return trip of 1,732 miles, with the same load, the average fuel consumption was 11.1 miles per gallon. The best fuel economy reported was on a stretch of 140 miles at an average speed of 42 miles an hour when the rate was 12.2 miles per gallon.

The engine used is a Waukesha-Hesselman Model 6-BKH with six cylinders, having a bore and stroke of 3¾x 4¼ inches, a displacement of 282 cubic inches and a maximum horsepower rating of 75. The main difference between this and a diesel engine is that this is a low-compression solid-injection fuel-oil engine using battery or

magneto ignition. The Hesselman engine has been built by the Waukesha Motor Co., of Waukesha, Wis., for the last three years and used in industrial

machinery. Many of them have been used to drive Ingersoll-Rand portable air compressors, and have been shipped to all corners of the globe.



NO. 101 UNBEATABLE for Secondary Road Projects

Secondary road projects naturally call for low-cost surfaces requiring the application of bituminous materials. There is one outfit that surpasses all others and meets every requirement for such work. It is the Littleford No. 101 Utility Spray Tank—made to be used for maintenance work or road oiling. Handles bulk material. Made in capacities from 300 to 800 gallons. Has one or more Hand Sprays for skin and penetration patching—Spray Bar for light road oil maintenance. Equipped with motor, pump, oil burner, heat flue. Let us tell you how this low-cost outfit will save you time and money—enable you to put more men to work and get more road for every dollar spent. Write for complete information. You'll be under no obligation.

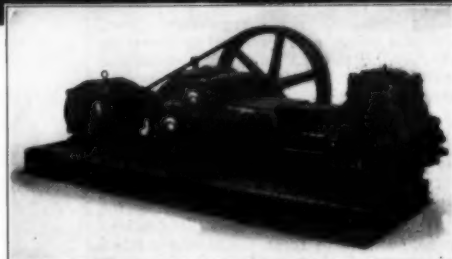


LITTLEFORD
Road Maintenance Equipment
SINCE 1900

LITTLEFORD BROS., 485 E. PEARL ST. CINCINNATI, O.

WATER UNDER PRESSURE

WHERE you want it,
WHEN you want it
with an F-M self-oiling power pump.



Out on the job, where there's water to be moved, pressure and delivery rate aren't the only things that count when there's a pump to be chosen. Its attendance requirements, its efficiency and its ability to deliver under adverse conditions—make a big difference both in operating costs and performance.

F-M self-oiling power pumps are especially built for service in remote and inaccessible locations. Sturdy and simple in design, they provide pressures up to 500 pounds per square inch, to handle a wide range of construction applications. Because they are completely self-oiling, attend-

ance is reduced to a minimum. The F-M power pump illustrated is driven with the efficient Flex-Mor drive. Other models are readily available with pulley for belt drive or with top-mounted electric motor connected by silent chain, self-enclosed. For service away from established power lines, they are also furnished with Fairbanks-Morse gasoline engine or Diesel drive. For complete information, address Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 32 branches at your service throughout the United States.

Pioneer
Designers
and
Manufacturers
of
POWER, PUMPING AND WEIGHING EQUIPMENT
105 Years

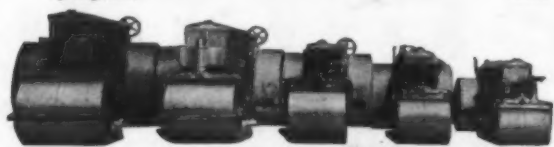
FAIRBANKS-MORSE
PUMPS

6440-PA31-18

BUFFALO-SPRINGFIELD ROAD ROLLERS

The extra years of service that you get out of your Buffalo-Springfield subtract a good round sum from your operating costs, and add that sum to your profits.

The Buffalo-Springfield Roller Co.
Springfield, Ohio



Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Profitable Trenching

447 Complete information on P & H good used trenchers, which have been entirely rebuilt and offer the contractor an opportunity to get into trenching work at a profit, may be secured by those interested from the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

Mechanical Marking Machine

448 The Simons mechanical marking machine for streets and highways, which is easily handled and controlled to meet ordinary or special marking conditions is described in Booklet G which may be secured upon request from the Simons Paint Spray Brush Co., Dayton, Ohio.

Road Rollers in 2½ to 17-Ton Sizes

449 Buffalo-Springfield Roller Co., Springfield, Ohio, will be glad to send to interested contractors and state and county highway officials complete information on Buffalo-Springfield road rollers, in 2½ to 7-ton sizes, which give smooth reliable service.

2 to 8-Inch Self-Priming Pumps

450 A copy of the combined catalog, describing the Sterling line of 2- to 8-inch self-priming pumps, and a valuable bulletin of engineering data may be secured by interested contractors from the Sterling Machinery Corp., 411-15 Southwest Blvd., Kansas City, Mo.

Efficiency for Construction Engines

451 Complete information on Air-Maze air filters, the use of which will insure the efficiency of engines particularly when working in dusty dirty conditions, may be secured by those interested from the Air-Maze Corp., 812 Huron Road, Cleveland, Ohio.

Backbones for Roads

452 Complete information on Flex-Plane contraction joints, which have been called the backbone of the road because they provide flexibility and prevent cracking and deterioration may be secured direct from the Flexible Road Joint Machine Co., Warren, Ohio.

New Road Rolling Principle

453 The Austin-Western Roll-A-Plane, a road roller constructed on a new principle with a small diameter roller located between the larger rolls, is described in literature which the Austin-Western Road Machinery Co., Aurora, Ill., will be glad to send on request.

Cutting and Welding Apparatus

454 Milburn cutting and welding apparatus for all types of light and heavy work, including torches, tips, regulators, hose, goggles and gloves, are described in literature which may be secured on request from the Alexander Milburn Co., 1409 W. Baltimore St., Baltimore, Md.

Steel Forms for Road Construction

455 Bulletin 101 recently issued by Heltzel Steel Form & Iron Co., Warren, Ohio, describes in detail Heltzel steel forms for modern road construction. The illustrations show the features of these forms, the method of setting, proof of strength, top rail attachments and other details.

Diesel Engines for Trucks

456 Cummins Engine Co., Columbus, Ind., will be glad to send to those interested complete information on Cummins diesel engines for trucks, shovels, compressors, pumps, drills, generators and other construction equipment, in 35 to 500 horsepower.

Wheel Dump Wagons

457 Koehring Co., 3026 West Concordia Ave., Milwaukee, Wis., will be glad to send to interested contractors complete information on the Koehring Wheel Dumptor, a wheel dump wagon for hauling, dumping and spreading, a feature of which is the low maintenance cost.

Simplified Arc Welding

458 This is the title of a useful booklet on the many profitable uses of arc welding in the construction field. Copies of this booklet are free to contractors who write to Hobart Bros., Box CE 85, Troy, Ohio.

A New-Type Leaning Wheel Grader

459 The new-type Adams leaning wheel grader, features of which are strength, rigidity, visibility, and a wide range of blade adjustments, is described in literature which J. D. Adams Co., Indianapolis, Ind., will be glad to send on request.

Street Maintenance Equipment

460 Literature and prices on its line of bituminous pressure distributors, street flushers, and street sprinklers may be secured by state and county highway officials and contractors from the Municipal Supply Co., South Bend, Ind.

Wire Bar Ties and Tying Tools

461 Vail Manufacturing Co., 1752 E. 75th St., Chicago, Ill., will be glad to send to those interested complete information and prices on its Gold Medal line of wire bar ties and tying tools.

Cutting Mowing Costs

462 Bulletin No. 3 describing the Detroit motor scythe, which is one-man operated and is claimed to cut mowing costs to the minimum may be secured by state and county highway officials direct from the Detroit Harvester Co., 5450 W. Jefferson Ave., Detroit, Mich.

Smoothing Out Road Difficulties

463 Galion Iron Works & Mfg. Co., Galion, Ohio, will be glad to send to interested contractors and highway officials literature describing Galion road rollers, in 5 to 12-ton sizes, styled to fit your requirements and pocket-books.

Concrete Equipment

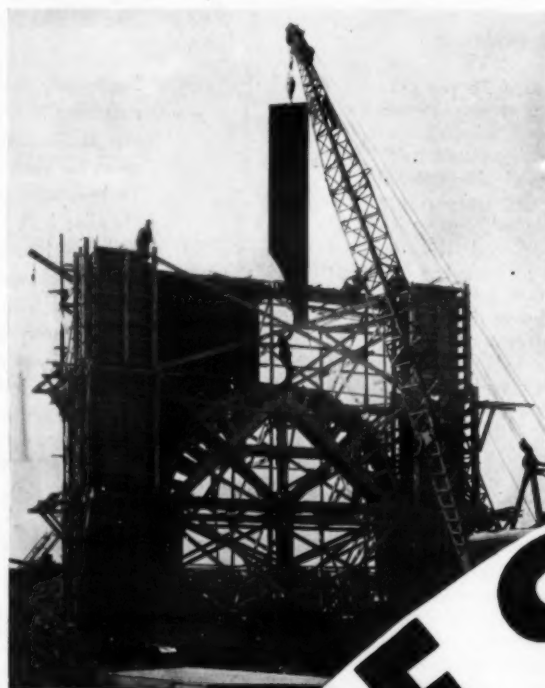
464 Literature describing Wonder tilting mixers, Master and Silverstreak drum type mixers, concrete carts, wheelbarrows and similar equipment may be secured upon request from the Construction Machinery Co., 500 Glenwood St., Waterloo, Iowa.

A Disc Spreader for Any Truck

465 Complete information on the Kob disc spreader which will fit any dump truck and spreads sand, gravel, chips, calcium chloride or cinders backward or forward may be secured direct from the Kob Mfg. Co., 320 E. Brown St., Milwaukee, Wis.

1935 Models of Bituminous Distributors

466 E. D. Etnyre & Co., 400 Jefferson St., Oregon, Ill., will be glad to send to interested contractors, state and county highway officials complete information on the improvements offered for 1935 in Models F and F02C Etnyre bituminous distributors.



Don't let your wire rope problems "Get" you. Thousands of operators will tell you, you can positively obtain the utmost satisfaction and surprisingly long service if you will switch right now to

PURPLE STRAND



WilliamSPORT

WIRE ROPE COMPANY

Main Office and Works: WILLIAMSPORT, PENNA. Branch Sales Offices: 122 S. MICHIGAN AVE., CHICAGO

SEND THIS BACK—WE'LL DO THE REST

CONTRACTORS and ENGINEERS MONTHLY
470 FOURTH AVE., NEW YORK

Please send me the following
literature, without cost or obligation

(Indicate by numbers)

Name _____

Firm _____

Street _____

City _____

P.S. Also send me catalogs and
prices on _____

A New Material Cart

The new modern two-wheel Ayrgo cart for transporting bulk cement, sand, wet concrete and similar materials, with a capacity of 11 cubic feet and designed to take the complete discharge of a 10-S mixer, is described in literature which the Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa., will be glad to send on request.

New Engine Catalog

The Lauson Co., New Holstein, Wis., has recently brought out a new catalog describing its complete line of vertical air and water-cooled engines ranging from 1/4 to 5-hp as well as horizontal models of 1 1/2 to 18-hp, copies of which are available upon request.

Concrete Cutting Tool

The trailer-type concrete breaker made by the Concrete Cutting Corp. of America, 52 Clark St., Brooklyn, N. Y., which speedily and economically breaks up old pavements, is described in literature which interested contractors and highway engineers may secure free on request.

New Catalog on Tapes and Rules

A new 256-page catalog covering the complete line of Lufkin measuring tapes and rules, micrometers and other precision instruments, in which the Lufkin Rule Co. has specialized for over fifty years, is available to interested contractors and engineers by writing to the Lufkin Rule Co., Saginaw, Mich.

New Pneumatic Tool Catalog

Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., will be glad to send to those interested copies of its new Catalog No. 50, describing and illustrating the complete line of Thor pneumatic tools, including rotary, piston and pneumatic tools and accessories.

New Booklet on Pipe Joints

A new 16-page booklet on Dresser couplings for water lines, intended for those interested in the construction, operation and maintenance of water lines, may be secured free on request from the S. R. Dresser Mfg. Co., Bradford, Pa. Ask for Form 355.

Air-Cooled 4-Cycle Motor

The Toro air-cooled 4-cycle motor, designed and built for heavy duty, in a number of models for varying requirements, is described and illustrated in literature which the Toro Manufacturing Co., Minneapolis, Minn., will be glad to send on request.

DIESEL DRAGLINES

50-B Bucyrus Erie Diesel Draglines, 50 ft. boom, 10 ft. extension, Atlas engine, caterpillar mounting; one with shovel attachment.

775 P & H Diesel Draglines, 50 ft. boom, Atlas engine, caterpillar mounting.

The above are part of the surplus construction equipment of the Middle Rio Grande Conservancy District. Write for list of all equipment, which includes pumps, compressors, lighting plants, tractors, shovels, pile driving outfits, concrete mixers, scales, limley concrete placing outfit, concrete heaters and vibrators, gravel screening plant, compressed air drill sharpeners, shop equipment, gasoline powered hoists with and without skips, bar welders and cutters, carbide floodlights, and other items at bargain prices.

R. L. HARRISON CO., Inc.
ALBUQUERQUE, NEW MEXICO

SALESMAN

Aggressive and wide-awake, wanted, to represent manufacturer of air compressors and hoists. Please reply giving references and past experience.

Box HD

Contractors & Engineers Monthly
470 Fourth Avenue, New York

GEORGE HAISS MFG. CO., Inc. Canal Pl. & E. 142 Street New York

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ATHEY-Crawlers, Dump Wagons, Trailers
BUCKYRUS-ERIE - Power Shovels, Cranes, Draglines
PIONEER-Crusher, Gravel Plants
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Dittler Mfg. Co.-Hercules spreaders
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Killer Tractor Co.-Road and farm tools
LaPlant-Choate Mfg. Co.-Bulldozers, backfillers, wagons, snow plows
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BUTLER-Blms
CENTAUR-Road Mowers
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Buffalo-Springfield Road Rollers
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Hewitt Belling, Hose
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NAUCK-Oil Burners and Heaters
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DIAMOND—Roll, Jaw Crushers
HERCULES—Gas Road Rollers
LAPLANT-CHOATE—Wagons, Bulldozers
BLUBER-McLEAN—Wheelers, Rippers, Fresno
THEW—Shovels, Cranes
WONDER—Mixers, Pumps, Hoists

Member: Associated Equipment Distributors

THE BLAISDELL-FOLZ EQUIP. CO.

205-219 West Pearl St. Cincinnati, Ohio

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machinery
Chain Belt Co.—Box Pavers, Moto-Mixers, Building Mi-
nors and Pumps
Northwest Engineering Co.—Gasoline Shovels, Cranes,
Draglines, Full Shovels
Ingersoll-Rand Co.—Compressors, Pneumatic Tools, Pumps
Clyde Salm Co.—Hoisting Engines, Derricks
Gravo-Degle Co.—American Tubular Towers
Sawman Bros., Inc.—Cableways, Power Scrapers, Esc-
vators
Universal Crusher Co.—Crushers
The C. S. Johnson Co.—Bins, Batches
Doister Machine Co.—Flat-O Vibrator Screens
Vulcan Iron Works—Pile Hammers
Wellman Engineering Co.—Clamshell, Dragline Buckets
Sagen Derrick Co.—Derricks

Member: Associated Equipment Distributors

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Breakers, etc.
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JAEGER—Truck Concrete Mixers
KILLEFER—Road Rippers and Rooters, Road Discs,
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JONES-SUPERIOR—Portable Saw Tables, etc.
COLUMBUS—Elevators and Conveyors
SIMPLICITY—Screens
OSGOOD—Shovels, Cranes, etc.
HERCULES—Rollers**THE CLETRAC OHIO SALES CO.**

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Cleveland Ohio

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Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled
Compressors
THE EUCLID ROAD MACHY, CO.—Crawler
Wagons, Scrapers
THE WALSH SNOW PLOW CO.—Snow Plows
D-A LUBRICANT CO.—Oil
THE ROC COMPANY—Winches**THE DAY & MADDOCK CO.**

Equipment Headquarters

8201 Almiral Ave., Cleveland, O.

Representing

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American Terry Derricks
American Scrapers & Road
Drags
Barnes Pumps
Cleveland Formgraders
German-Rupp Self-Priming
Centrifugals
Halls Loaders
Hercules Road Rollers
Hill Surfactors
Independent Pneumatic &
Electric Tools
La Crosse "Tu-Way" Trail-
ers
Kelley Flat Machines
Knickerbocker Mixers
Wall Vibrators & Grinders
National V-Q Carbide Lights
Sawman Crescent Scrap-
ers & Blocks
Sterling Wheelbarrows
Sullivan Compressors, Tools
& Hose
Teegler Screens
Tolado Torches
Universal Crushers**H. B. FULLER EQUIP. CO.**

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Representing

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Link-Belt Co.—Shovels, Cranes, Draglines, Locomotive
Cranes
Ransome Contr. Machy. Co.—Pavers, Constr. Mixers, Tow-
ers and Chuting Equip.
Baldwin Locomotive Works (Internal Combustion Divi-
sion)—"Whitcomb" Locomotives, J.—Gasoline, Diesel,
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Electric Tamping & Equip. Co.—Concrete Vibrators, Elec.
Tampers
Moritz-Bennett Corp.—Road Shoulder Finishers, Form
Concrete Surfacing Machinery Co.—"Berg" Surfactors
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Mohawk Asphalt Heater Co.—Asphalt Kettles, Heaters**INDUSTRIAL ENGINE PARTS, INC.**

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Wico Electric Co. Pierce-Governor Co.
Portable Power Tool Corp. Hercules Prod. Co.
Leffel Co.**W. T. WALSH EQUIPMENT CO.**

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Barnes Mfg. Co.—Gasoline
Hammers
Bonnet Company—Crushers
Cleveland Rock Drill Co.—
Air Tools
Diamond Iron Works—
Crusher Plants
Euclid Road Machinery Co.—
Wagons
Foote Company—Pavers
General Excavator Co.—
Shovels
Hough-Universal—Sweepers
Huber Mfg. Company—Roll-
ers
White Mfg. Co.—Chausse-
Heaters
McCormick-Deering—Trac-
tors
McKiernan-Terry Corp.—
Pile Hammers
Michigan—Power Shovels
Newo Engine Co.—Engine
Light Plants
Rosa Mfg. Co.—Rosa Dis-
tributors & Oilers
Romo—Graders
Schramm, Inc.—Air Com-
pressors
Timken—Bits
Viber Co., Ltd.—Concrete
Vibrators
Wellman Engineering Co.—
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Wendler Concrete Mixers
Marlow Centrifugal Pumps
Marlow Diaphragm Pumps
Chrysler Portable Air Compressors
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Hayward Clamshell Buckets
Huber Rollers
Archer Towers, Buckets
LaCrosse Tu-way Trailers
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HOUGH-UNIVERSAL Road Sweepers
JACKSON Concrete Placement Vibrators
LINK-BELT Power Shovels and Cranes
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Pioneer Gravel Equipment
Phillip Carey Elastite
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Foote Co.—Pavers
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Gallon Iron Works & Mfg. Co.
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UNIVERSAL Form Clamps
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CHAIN BELT Concrete Mixers, Saw Rigs, Pavers
NOVO Engines, Hoists, Pumps
WYOMING Shovels, Picks
SAUERMAN Cableways
CLEVELAND Wheelbarrows
BATES Wire Ties
PULSOMETER Steam Pumps
PATENT Safety Swinging Scaffolding
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CLIMAX—Gasoline Engines
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Sagson Derrick Co.
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Sterling Wheelbarrow Co.
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Byers Machine Co.
Leiford Co.
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W. Toepfer & Sons Co.
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McKiernan-Terry Co.
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Sagson Derrick Co.
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ALLIS-CHALMERS Indus. & Truck Type Tractors; Power-Operated Elevating & Blade Graders, Motor Patrol Graders, Track Type Wagons
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DROTT Bulldozers, Scrapers, Eliminators
HOUGH-UNIVERSAL
Wausau Snow Plows
DAVEY Air Compressors
OSHKOSH 4-Wheel Dr. Trucks
KINNEY Road Rollers
TORO Highway Mowers
HERCULES Road Rollers
LA CROSSE Tu-way Trailers
CLEVELAND Rock Drills
HUCK Tar Kettles, Heaters
KOB Band Spreaders
RUSSELL Plows, Scrapers
WAUKESHA Plows, Scrapers
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Phone: Orchard-6580

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Buffalo-Springfield Co.
Burch Corp.
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Clyde Iron Works
Euclid Road Machy. Co.
Geddry Conveyor Co.
Iowa Mfg. Co.
Killefer Mfg. Corp., Ltd.
Lynn Iron Works
McKiernan-Terry Corp.
Pacific Marine Supply Co.
Pulsometer Steam Pump Co.
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Sagson Derrick Co.
Sauerman Bros.
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Systron Co.
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Universal Form Clamp Co.
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Hi-Way Service Corp.
All Steel Products Mfg. Co.
LaPlant-Choate Mfg. Co.
National Steel Car Corp., Ltd.
National Equipment Corp.
Koebering Div., Parsons
Leiford, Erik-Mix. Div.
Schrann, Inc.
American Tractor Equip.
Lehart Wagon Co.
Sterling Machinery Corp.
The Byers Machine Co.
Killefer Mfg. Co.
Detroit Harvester Co.
Barton-Springfield Roller Co.
Brookville Locomotive Co.
The W. K. M. Company
The Buda Company
Highway Trailer Co.
Pioneer Gravel Eq. Mfg. Co.
Contractors Mach. Corp.
Blaw-Knox Company
Insley Manufacturing Co.
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C. H. & E. Mfg. Co.
Yard Pile Company
Wood Hydr. Hoist & Body Co.
R. G. Le Tourneau, Inc.
The Anthony Co., Inc.
Williamette-Hyster Co.

THE ALBERT OLSON CO., Ltd.

1148-50 Osler Street

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Representing

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Road Equipment
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LENHART Dump Wagons
LA PLANT-CHOATE Equipment
KILLEFER Scrapers
EUCLID Equipment
P. & H. Shovels and Cranes
PEDLAR PEOPLE'S Culverts

Contractors and Engineers Monthly

Filling the "Bottomless Hole" at the Site of the New Highway Bridge Over the Bonnet Carré Spillway. Left, Loading One of the Industrial Trains at the Borrow Pit. Below, Dumping. Right, Spreading Fill with a Dragline. See Page 5.

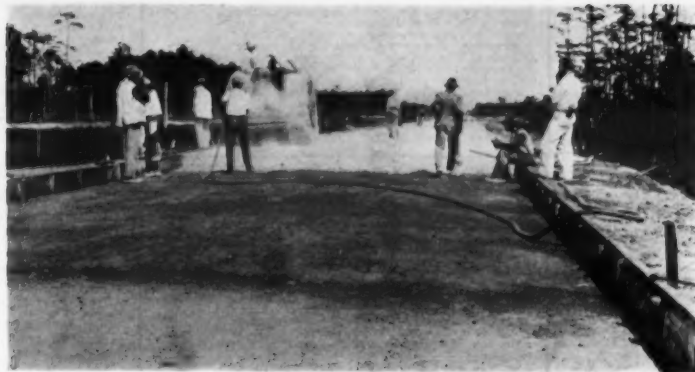


C. & E. M. Photos



Photo by Rudy Arnold

No—Not a Block of Granite! Just Placing a 100-Pound Cake of Ice in Position Under a Telephone Conduit Which Was Being Lowered from 14 to 39 Inches by the New York Telephone Co. Near Floyd Bennett Airport, New York City. See Page 2.



Above, The Wood Forms for a Georgia Limerock Base Road. Note Method of Staking Inside the Forms. Sprinkling and Rolling in Background. Right, Dumping a Load of Florida Limerock Which Is Hauled Over the New Base as Laid. Georgia Limerock Is Back-Dumped As It Ruts Badly Before It Sets Up. See Page 2.

The State Highway Board of Georgia Is Improving Many Highways with a Native Limerock Base, Using Georgia or Florida Limerock with a Light Bituminous Surface Treatment. This Type of Pavement with an 8-Inch Base Compares Favorably with Standard Pavements Although It Costs Less.



It Doesn't Look Much Like the Garden of Eden, Without the Well-Known Fig and Apple Trees, But, "Believe It or Not," It Is. The American Equipment Shown Is Working on an Irrigation Project on the Supposed Site of the Original Garden. See Page 19.



C. & E. M. Photo

S. O. Maxey & Co. Poured 1,100 Feet of 20-Foot Slab a Day with Two 5-Hour Shifts on U. S. 70 Near Walters, Okla., This Spring. The Efficient Bulk Cement Dock Is Shown Above. See Page 1.



C. & E. M. Photo

Norris Dam Is Still Playing to S.R.O. This TVA Project Has Been Drawing Crowds of Tourists This Summer Who Gaze Down from This Vantage Point on the Scene Shown on Page 1.



C. & E. M. Photo

The Visiting Hordes at Norris Dam Catch a Glimpse of the Finished Project When They See This Miniature Close By the Automobile Parking Areas Above the Dam.